Fife-Tidland GmbH
GLOBAL WEB MANAGEMENT SOLUTION
guiding inspection slitting winding

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GB

SE-46
Operating Instructions

Digital Line Sensor

SE-46.Deckblatt.fm

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1 INTRODUCTION

About these operating instructions

These Operating Instructions describe the commissioning, operation and maintenance of the SE-46 digital line sensor and provide important instructions for proper use.

These operating instructions are intended for both the system construction master as well as the operator who uses the SE-46 sensor in production. The Operating Instructions must be read and applied by everyone who is responsible for commissioning, operating or maintaining the SE-46 sensor.

The Operating Instructions must be carefully kept and must always be available throughout the service life of the SE-46 sensor.

Translation of the original Operating Manual:
This Operating Manual is a translation. The original Operating Manual was composed in German.

Proper use

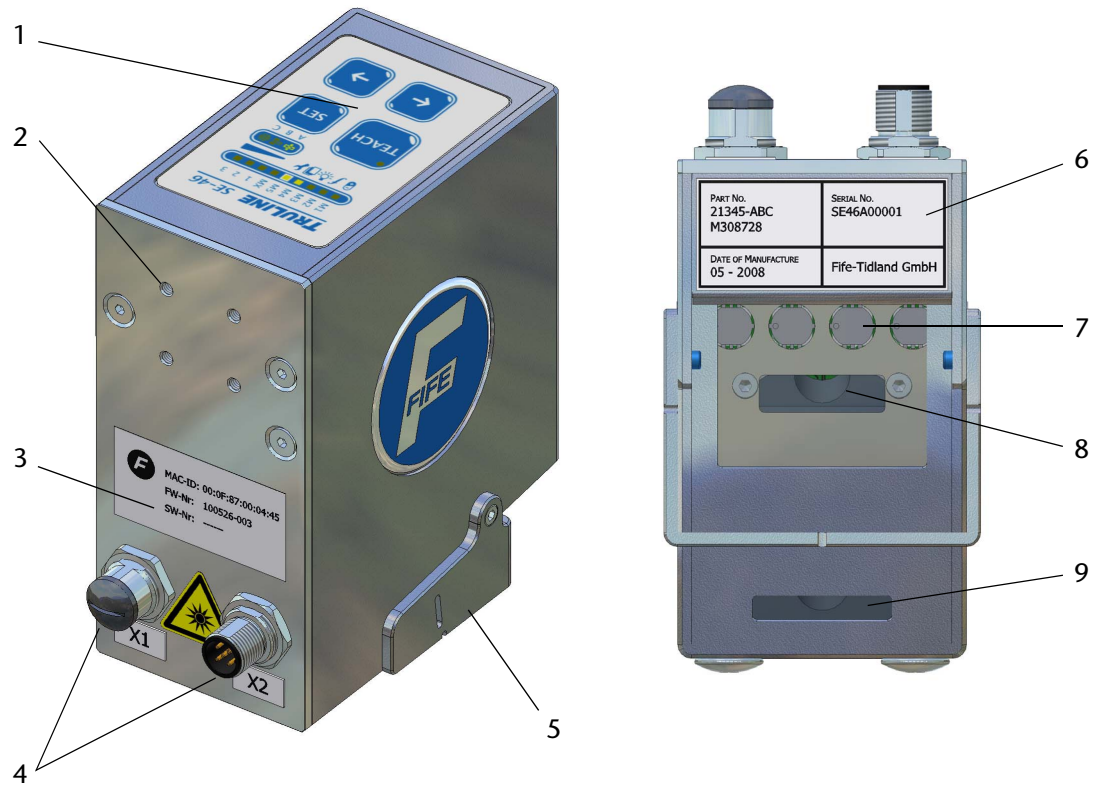
The SE-46 sensor is a line sensor for web guiding systems with an optical viewing range of 30 mm. The SE-46 recognises a calibrated reference on the material web and generates guide signals from it that are used together with a web guide controller from Fife-Tidland GmbH for precise guiding of the material web.

Note:
The SE-46 sensor must not be opened.

If the SE-46 sensor is opened, no claims will be honoured under the warranty.

Operating principle

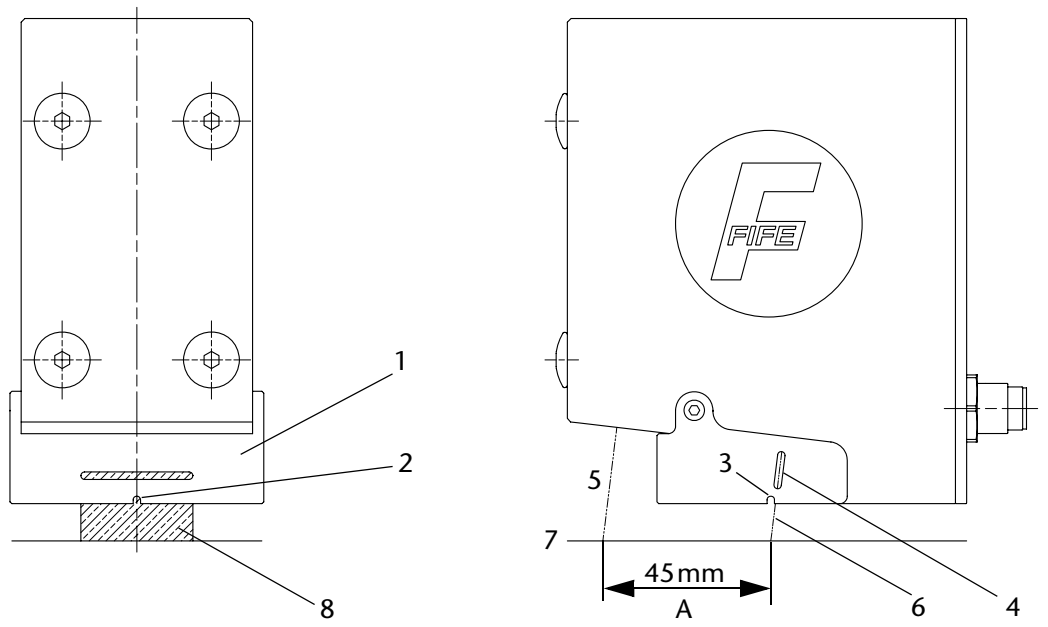
Active illumination (7) makes the material web brighter, which makes Information such as contrast transitions, lines or structures more visible. The SE-46 sensor samples this information with an imager (8) and compares it with an image line of the template saved during the calibration (reference). The sensor derives the position difference (offset) from this information if the similarity is sufficient.



1 Keyboard
2 Threading for sensor bracket
3 Software numbers
4 Connections
5 Ambient light hood
6 Nameplate
7 Illumination
8 Imager
9 Target light

Fig. 1.1: Layout of the SE-46 sensor

A target light (9 - *Fig. 1.1*) makes it possible to display detected positions on the material web while operation continues. The distance between the target light and the viewing area is 45 mm (see also A in *Fig. 1.2, page 1-3*).



1 Ambient light hood
2 Marking of sensor center line
3 Marking of viewing area at a distance of 10mm
4 Marking of viewing direction
5 Target light
6 Viewing direction
7 Material web
8 Sensor field of view

A Distance from the viewing area to the target light

Fig. 1.2: Ambient light hood and target light

The notch in the front (2) of the ambient light hood identifies the center of the sensor field of view.
When the distance between the sensor and material web (7) is 10mm, the notch in the side (3) of the ambient light hoot is located exactly above the viewing area.
The side slots (4) in the ambient light hood indicate the viewing direction (6) independently of the distance from the sensor to the material web.

Options

Illumination

The SE-46 sensor provides high-intensity colour lighting (RGB) for on-light applications that can be used to make even very faint orientation features visible.

Fife-Tidland GmbH offers additional types of illumination for other applications that cannot be detected with this standard lighting.

Beginning with firmware version 004, the sensor can also be used for back light applications.

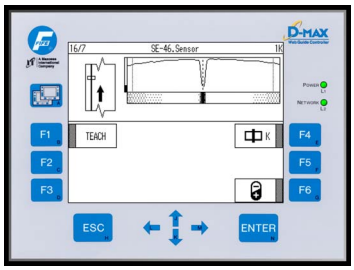


Fig. 1.3: D-MAX operator interface

A D-MAX operator interface is used for control

The SE-46 sensor can also be set and calibrated with a D-MAX operator device. This may be a convenient solution, for example, if the SE-46 is mounted in a place that is not suitable for operation or if guiding of the material web is implemented by a D-MAX system.

2 SAFETY INSTRUCTIONS

Notes on using the SE-46 sensor

Problem-free and reliable operation of the SE-46 sensor requires that the system be properly transported, stored, installed and placed in operation. Proper operation and careful maintenance will ensure a long service life for your sensor.

Only persons who are acquainted with the installation, commissioning, operation and maintenance of the sensor and who possess the necessary qualifications for their activities may work on the SE-46 sensor.

Please note the following:

- The content of these Operating Instructions
- National and local requirements for accident prevention and environmental protection

Information about safety instructions

The safety instructions and symbols described in this section are used in these Operating Instructions. They are used to avoid possible dangers for users and to prevent material damage.

Safety instructions

SIGNAL WORD:
Source of danger and its results.

⇨ Avoiding dangers.

The signal word **WARNING** refers to the danger of moderate to severe bodily injuries.

The signal word **CAUTION** refers to the danger of slight to moderate bodily injuries or material damage.

Symbols

Warning/caution - dangerous area

Reference to general hazards that may result in bodily injuries or damage to the device

Warning/caution - danger due to crushing

Refers to danger of injury caused by crushing

Warning/caution - danger due to cutting

Refers to danger of injury caused by cutting

Warning/caution - danger due to temporary blinding

Refers to dangers that may be caused by being briefly blinded.

Additional symbols

– This dash is followed by an enumeration.

- This dot is followed by a prompt to do something.

1. Prompts following describing what to do in numbered order.

Note:
Reference to important information.

Hazards

Observance of the following points is mandatory to ensure reliable work with the SE-46 sensor.

Installation and commissioning

- If a sensor is damaged, it must not be installed or placed in operation.
- All assembly tasks on the sensor must only be performed when there is no electrical power in the system.
- Assembly tasks and mechanical settings must only be performed when the machine has been stopped and secured from being turned on again.

- The sensor must only be placed in operation if it has been securely mounted.
- Electrical connections on the sensor should always be made or disconnected while there is no electrical power in the system. Failure to observe this instruction may result in damage to the sensor.
- The parameters specified in Section *Technical data* must be observed.
- Only accessories and replacement parts that have been approved by Fife Tidland may be used.
- No changes may be made to the sensor.

- Avoid direct visual contact with the sensor lighting. The radiated power is very high and may result in temporary blindness or damage to eyes.

  Temporary blindness or dazzling may diminish visual capacity and cause afterimages. This in turn may result in accidents in the workplace.

  Care must therefore be taken not to place the sensor in operation until it is mechanically fastened to its intended support rod and the material web has been moved in front of the sensor's field of vision.

Operation

- During operation, do not touch or reach close to moving parts (rollers, web). There is a danger of being crushed.

- There is a danger of being cut by the web edge due to the web material and/or the movement of the web itself.

- Avoid direct visual contact with the sensor lighting during operation (for example during a web change).

Maintenance

- Maintenance work must only be performed on the sensor when the power is turned off, the machine is stopped, and it is protected against being turned back on.

3 INSTALLATION

Transport and storage

- The sensor must be protected against slipping during transport.
- The sensor must be stored in a cool, clean, and dry place.
- The sensor must not be stored close to strong magnetic fields. The electronic components of the sensor could be damaged.

Scope of delivery

- Sensor SE-46
  The model designation, serial number, and the firmware and software numbers are on the nameplates on the housing.
- Operating Instructions

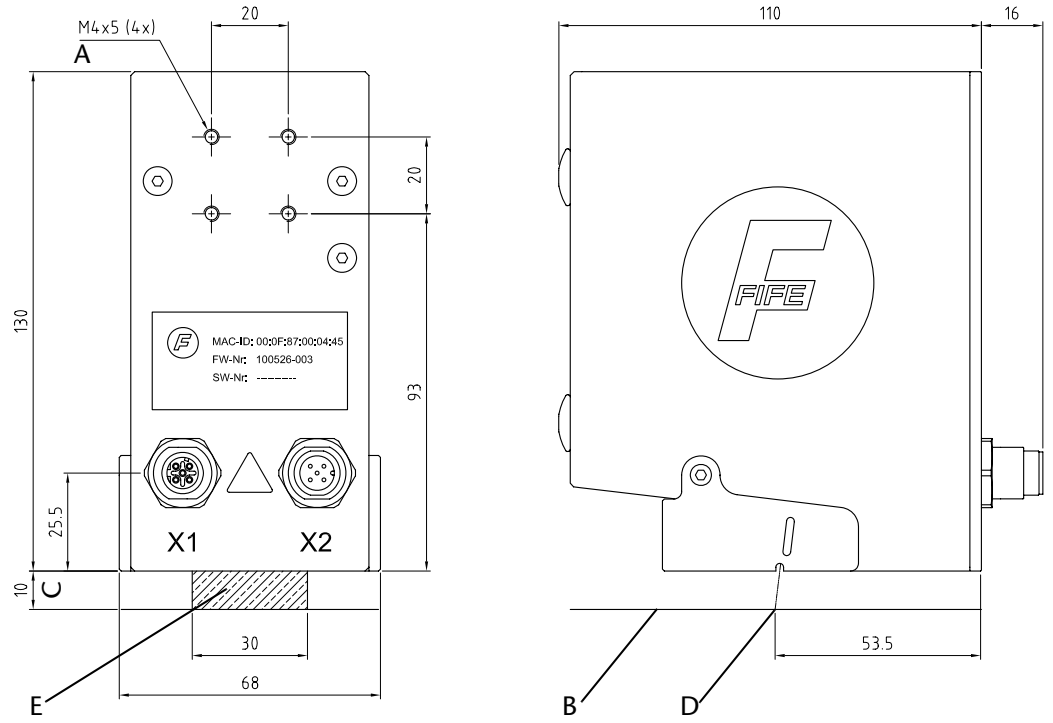
Mounting

WARNING:
⇨ All assembly tasks on the sensor must be performed when there is no electrical power in the system.

⇨ Assembly tasks and mechanical settings must only be performed when the machine has been stopped and secured from being turned on again.

Dimensions

Fig 3.1 shows the dimensions of sensor SE-46.



A Mounting holes
B Material web
C Recommended distance from the material web to the sensor
D Viewing area
E Sensor field of view

Fig. 3.1: Dimensions of sensor SE-46

Installation location of sensor SE-46

- Protection class: IP54
- Operating temperature: 0°C ... 60°C
  Relative humidity up to 90% non-condensing
- Protected from vibrations
- Do not place close to strong magnetic fields:
  The electronic components may be damaged.
- The SE-46 sensor is normally mounted at a distance of 10mm from the material web (see C in *Fig 3.1*).
- Unless another arrangement is recommended, mount the SE-46 sensor directly behind the offset pivot guide. The greater the distance from the sensor to the offset pivot guide, the lower the guiding accuracy.

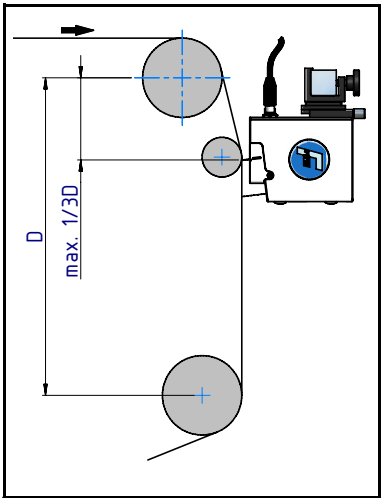


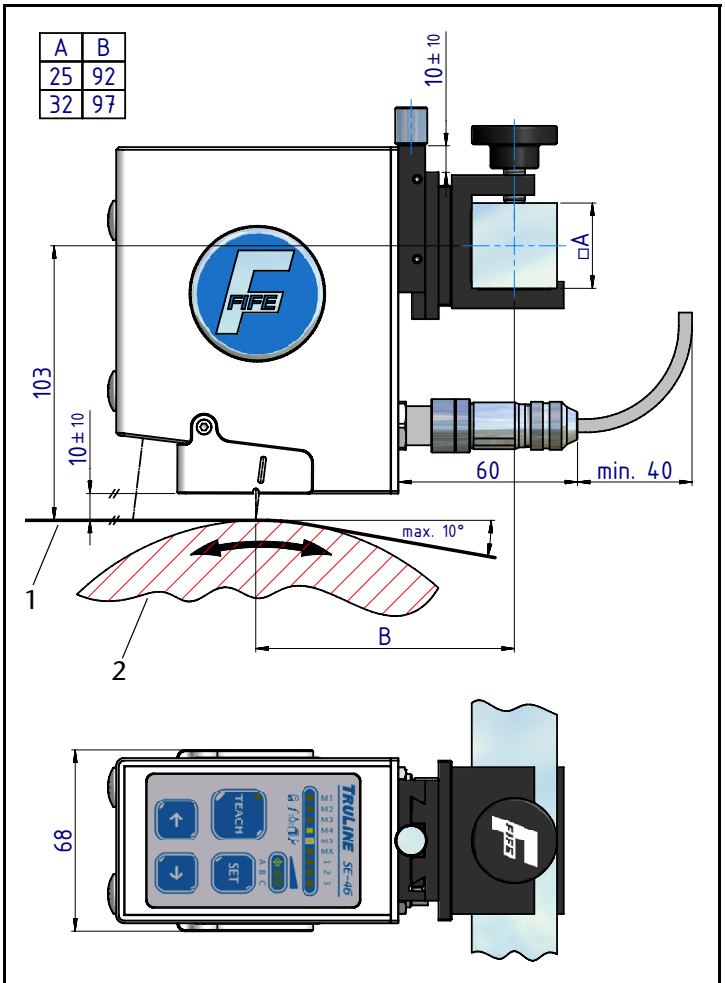
Fig. 3.2: Assembly location of SE-46

– The material edge must be guided through a support roller in the sensor field of view so that there is no plane change (see *Fig 3.2*).

– The material web must run parallel to the lower edge of the sensor (see *Fig 3.3*).

– On-light applications:
Ideally the viewing area on the material web should be on or just behind the support roller (see *Fig 3.3*).

– Back light applications with external light source:
The SE-46 sensor must be mounted either between two rollers or close behind one support roller.



1 Material web 2 Support roller

Fig. 3.3: Sensor SE-46 and support roller

Mechanical fastening

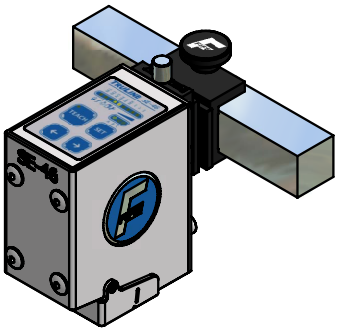


Fig. 3.4: SE-46 mounted

To assist in mounting the SE-46 sensor, holes have been drilled in the housing (see A in *Fig 3.1*). Together with various sensor bracket, this provides a wide range of installation options.

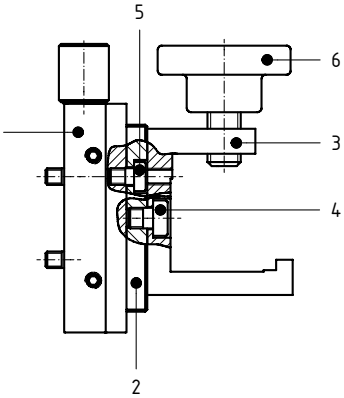


Fig. 3.5: Sensor bracket M

Assembly of the SE-46 with sensor bracket M

Sensor bracket with distance adjustment

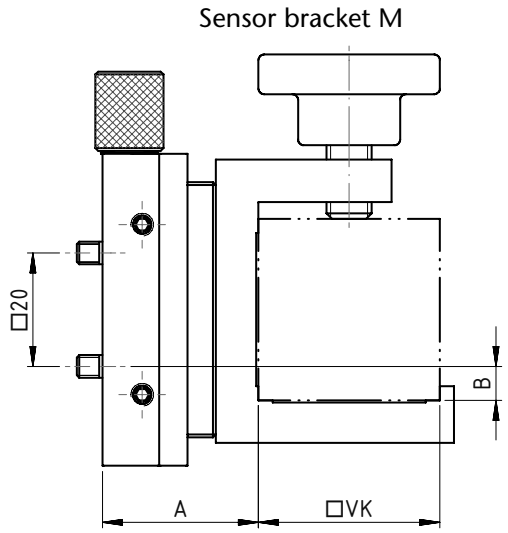
- Screw the micro-adjusting device (1) onto the SE-46 sensor with the M4x6 screws

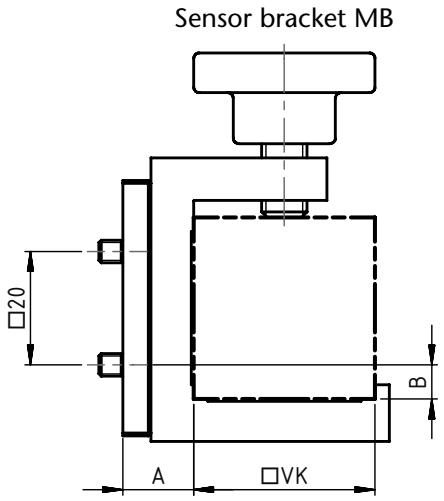
CAUTION
If longer screws are used, there is a danger of destroying the electronics located in the sensor's housing.

⇨ Because of this, make certain when fastening the sensor bracket onto the SE-46 sensor that only the original M4x6 screws or identical ones are used.

- Screw the adapter plate (2) onto the micro-adjusting device (1) with the M4x6 screws (5)
- Screw the sensor bracket (3) onto the adapter plate with the M5x6 (4) screws
- Screw in the star knob (6)
- Push the assembled unit onto the rectangular bar

Note:
Sensor bracket M can also be assembled directly onto the sensor with the adapter plate and without the micro-adjusting device (see *Assembly of the SE-46 with sensor bracket MB, page 3-5*).





	VK	A	B
M-20	20	25,5	0,5
M-25	25	26	2,5
M-32	32	27,5	6

	VK	A	B
MB-20	20	10,5	0,5
MB-25	25	11	2,5
MB-32	32	12,5	6

Fig. 3.6: Sensor bracket M and MB of the SE-46

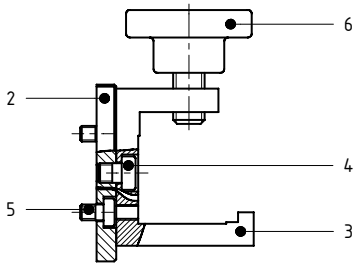


Fig. 3.7: Sensor bracket MB

Assembly of the SE-46 with sensor bracket MB

Sensor bracket without distance adjustment

- Screw the adapter plate (2) onto the sensor with the M4x6 screws (5)

CAUTION

If longer screws are used, there is a danger of destroying the electronics located in the sensor's housing.

⇨ Because of this, make certain when fastening the sensor bracket onto the SE46- sensor that only the original M4x6 screws or identical ones are used.

- Screw the sensor bracket (3) onto the adapter plate with the M5x6 (4) screws
- Screw in the star knob (6)
- Push the assembled unit onto the rectangular bar

Electrical connection

CAUTION:
Electrical connections on the sensor should always be made or disconnected while there is no electrical power in the system.
Failure to observe this instruction may result in damage to the sensor.

The sensor must be connected to the web guide controller as shown in the system diagram that appears in the system documentation.

Connections on sensor SE-46

Connection	Designation
X1	Ethernet (optional)
X2	Power supply and control signals

For technical details and additional information, please consult Section *12 Technical data*.

4 COMMISSIONING OF THE SE-46 SENSOR

Sensor SE-46

The sensor can be placed in operation when

- all assembly and connection tasks have been checked and
- the SE-46 is in proper working condition.

WARNING:
There is a danger of cutting on the material web and a danger of crushing on the actuator if the web guide controller to which the sensor is wired is placed in operation.

⇨ Therefore, do not reach onto or close to the material web or moving parts of the connected actuator.

WARNING:
If there is direct visual contact with the sensor lighting, there is danger of temporary blinding and accidents occurring as a result (see also page *2-3*).

⇨ Avoid direct visual contact with the sensor illumination.

1. Turn on the electrical power to the sensor, either through the connected web guide controller or through a separate power supply.

   The SE-46 sensor is ready for operation about 3 seconds after the power supply unit is turned on.
   The last settings that were active are loaded.

2. The sensor should be mounted at a distance of 10mm from the surface of the material web. This mechanical setting can optionally be checked with an adjustment tool.
(see *M5.1 Distance Gauge, page 7-9*)

3. The sensor is now ready for operation and can be calibrated to the desired reference (contrast transitions, lines or patterns.
(see *Calibration of the SE-46, page 6-7*)

Note:
Despite the SE-46's high immunity to extraneous light, drastic changes in ambient lighting conditions should be avoided during operation. This could result in the reference no longer being clearly detected or being lost entirely.

4. If the sensor is used with a web guide controller, the web guide controller must be set up.

Note:
When a complete system is delivered, it has already been calibrated in the factory.
However, this does not apply to replacement parts or replacement part deliveries.

Make the following settings on the web guide controller:

1. Calibrating analog signal inputs
2. Setting the ASC (Automatic Sensor Control)
3. Setting the polarity and gain

(see also the information about D-MAX web guide controllers (page *5-1*), DP-20 (page *5-8*) and CDP-01 (page *5-14*))

5 COMMISSIONING OF WEB GUIDE CONTROLLERS

D-MAX

Note:
Detailed information about sensor calibration is available in the "D-MAX Operating Instructions". "Supplementary Operating Instructions“ may also be available.

Precondition:
The SE-46 sensor is connected to the D-MAX Controller as specified in the system diagram to X5 or X9.

The SE-46 sensor can be operated via

– the sensor keyboard **or**

– a D-MAX operator interface (D-MAX OI).
In this case the A key (select "Device") must be used during the calibration process to switch between the D-MAX controller (controller menu structure) and the SE-46 sensor (sensor menu structure) when operation requires doing so.

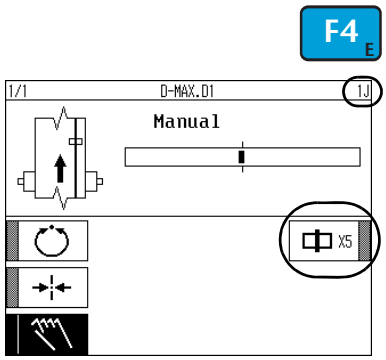
1. Calibrating the analog signal inputs of the D-MAX Controller

Note:
Calibration for analog control signals must only be performed if the SE-46 sensor is **not** connected via an Ethernet cable with the D-MAX Controller.

1.1. Preparing the D-MAX Controller for the calibration

a. **D-MAX operator interface** (D-MAX OI):
Press the A key to select the D-MAX Controller to which the SE-46 sensor is connected

b. **D-MAX operator interface** (D-MAX OI):
Press the F3 key to set "Manual" operating mode on the selected D-MAX Controller



c. D-MAX operator interface (D-MAX OI):
Press the F4 key to
- select the job with y = 'J' if the SE-46 sensor is connected to input X5 or
- select the job with y = 'K' if the SE-46 sensor is connected to input X9.

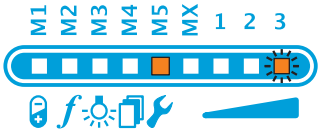
The entry changes in the second place of the menu identification depending on the job selected.

Note:
If the job cannot be selected with y = 'J' or y = 'K' , the software of the D-MAX Controller has not been prepared for analog sensor signals. Please check the system documentation!

The calibration process cannot be continued.

1.2. Call menu M5.3 *Simulate Analog Signals* on the SE-46

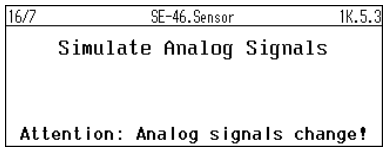
The analog signals required for the calibration are simulated by sensor SE-46.



a. Sensor keyboard:
Select menu M5.3 *Simulate Analog Signals*
(press the SET key for 1 second → Select parameter M5 → Press the SET key → Select parameter M5.3)

Press the SET key.

or



Menu structure of the SE-46 sensor (D-MAX OI):
Select menu xy.5.3 *Simulate Analog Signals*
(Hardware Settings → Simulate Analog Signals)

Press the ENTER key

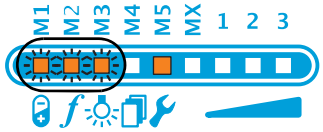
Note:
See *M5.3 Simulate Analog Signals, page 7-10* for additional information.

1.3. Calibrating the locking signal on the D-MAX

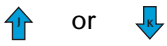
Depending on how the sensor is connected to the D-MAX Controller, perform the calibration for:

- S 01 - Locking signal (menu 1y.5.1.1) if the SE-46 sensor is connected to input X5 or for
- S 03 - Locking signal (menu 1y.5.1.3) if the SE-46 sensor is connected to input X9.

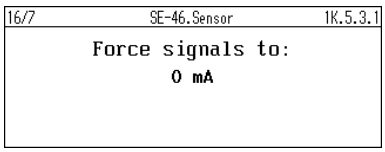
a. Sensor keyboard:
Press the Left Arrow key to select 0mA

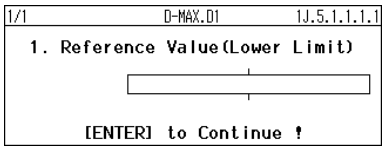


or



Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 0mA

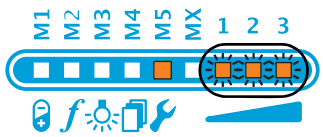




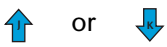
b. Menu structure of controller (D-MAX OI):
Select menu 1y.5.1.1.1 for S 01 or 1y.5.1.3.1 for S 03 (Hardware IOs → Sensor Setup → S 01 (X5/1) or S 03 (X9/1) → Calibration → 1. Reference Value (Lower Limit))

Press the ENTER key

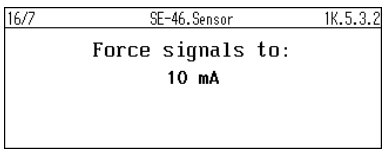
c. Sensor keyboard:
Press the Right Arrow key to select 10mA

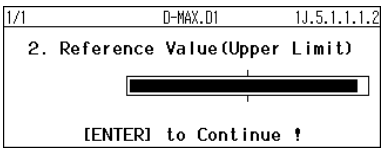


or



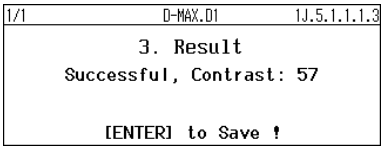
Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 10mA





d. Menu structure of controller (D-MAX OI):
(2. Reference Value (Upper Limit))

Press the ENTER key



e. Menu structure of controller (D-MAX OI):

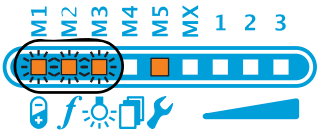
Press the ENTER key to save the calibration

1.4. Calibrating the position signal on the D-MAX

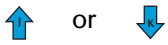
Depending on how the sensor is connected to the D-MAX Controller, perform the calibration for:

- S 02 - Position signal (menu 1y.5.1.2) if the SE-46 sensor is connected to input X5 or for
- S 04 - Position signal (menu 1y.5.1.4) if the SE-46 sensor is connected to input X9.

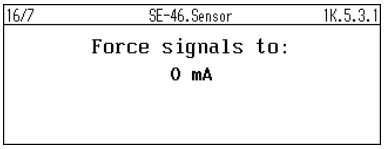
a. Sensor keyboard:
Press the Left Arrow key to select 0 mA

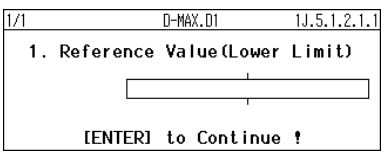


or



Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 0 mA

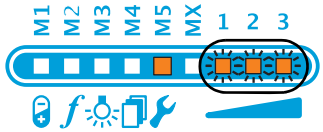




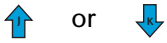
b. Menu structure of controller (D-MAX OI):
Select menu 1y.5.1.2.1 for S 02 or 1y.5.1.4.1 for S 04 (Hardware IOs → Sensor Setup → S 02 (X5/2) or S 04 (X9/2) → Calibration → 1. Reference Value (Lower Limit))

Press the ENTER key

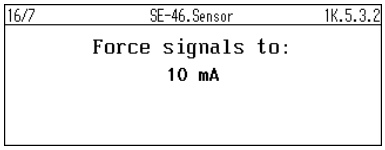
c. Sensor keyboard:
Press the Right Arrow key to select 10mA

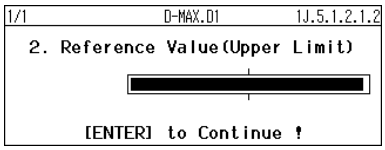


or



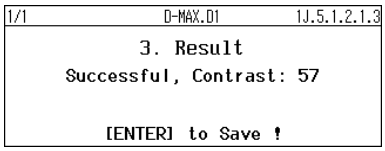
Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 10mA





d. Menu structure of controller (D-MAX OI):
(2. Reference Value (Upper Limit))

Press the ENTER key



e. Menu structure of controller (D-MAX OI):

Press the ENTER key to save the calibration

f. Menu structure of controller (D-MAX OI):
Press and hold the ESC key until you reach the user level of the controller

1.5. Exit menu M5.3 *Simulate Analog Signals* on the SE-46

a. Sensor keyboard:
To exit the menu M5.3 *Simulate Analog Signals* press the SET key

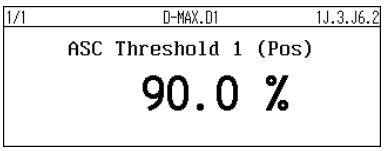
or

Menu structure of SE-46 sensor (D-MAX OI):
Press and hold the ESC key until you reach the top level of the sensor

2. Setting the ASC (Automatic Sensor Control)

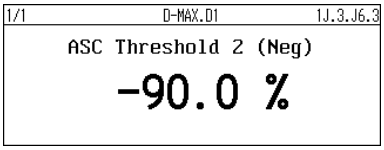
Note:
Connection to X5: job with y = 'J'
Connection to X9: job with y = 'K'

2.1. Setting ASC thresholds



a. Menu structure of controller (D-MAX OI):
Select menu 1y.3.y6.2
(Job Settings → ASC → ASC Threshold 1 (Pos))

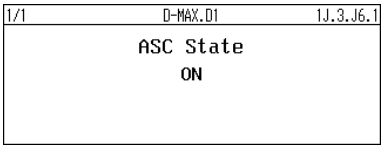
Set *ASC threshold 1 (pos)* to **90.0%**



b. Menu structure of controller (D-MAX OI):
Select menu 1y.3.y6.3
(Job Settings → ASC → ASC Threshold 2 (Neg))

Set *ASC threshold 2 (neg)* to **-90.0%**

2.2. Switching on the ASC function



a. Menu structure of controller (D-MAX OI):
Select menu 1y.3.y6.1
(Job Settings → ASC → ASC State)

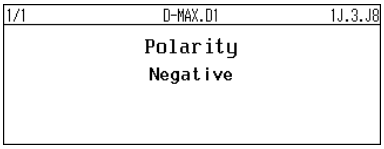
Set the *ASC status* to **ON**

3. Setting the polarity and gain

Note:
Connection to X5: job with y = 'J'
Connection to X9: job with y = 'K

3.1. Setting the polarity

The guiding direction (polarity) must be checked depending on the mechanical installation direction of the system and adjusted if necessary.

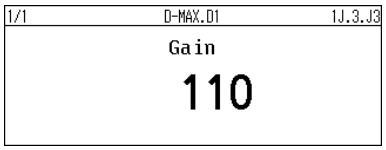


a. Menu structure of controller (D-MAX OI):
Select menu 1.y.3.y8
(Job Settings → Polarity)

Set the desired *polarity*

3.2. Setting the gain

The gain must be set optimally.



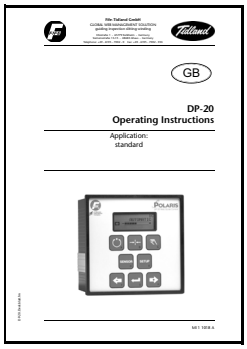
a. Menu structure of controller (D-MAX OI):
Select menu 1.y.3.y3
(Job Settings → Gain)

Set the *gain*

Operation

Note:
Depending on whether the sensor is connected to X5 or X9, operation on the D-MAX Controller in „Automatic" operating mode will proceed with job 'J' or 'K'.

DP-20



Note:
You can find detailed information about sensor calibration in the "DP-20 Operating Instructions".

The DP-20 must be equipped with firmware version 1.05 or higher.

Precondition:
The SE-46 sensor is connected to the DP-20 web guide controller on input X4. The calibration described here only applies to this input.

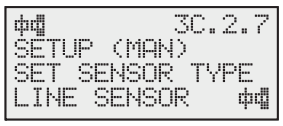
The SE-46 sensor can be operated via

- the sensor keyboard **or**
- a D-MAX operator interface (D-MAX OI).

1. Calibrating the analog signal inputs of the DP-20

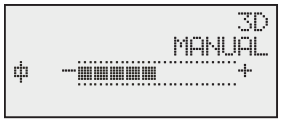
1.1. Preparing the DP-20 for calibration

a. DP-20 web guide controller:
Press the Manual key to set „Manual“ operating mode



b. DP-20 web guide controller:
Select menu 3x.2.7 *Set sensor type*
(Manual → Special → Set sensor type)

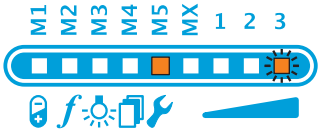
Set the *sensor type* to LINE SENSOR



c. DP-20 web guide controller:
Continue pressing the Sensor key until sensor line centre - ⊕ is selected (menu 3D)

1.2. Call menu M5.3 *Simulate Analog Signals* on the SE-46

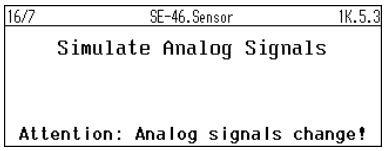
The analog signals required for the calibration are simulated by sensor SE-46.



a. Sensor keyboard:
Select menu M5.3 *Simulate Analog Signales*
(press the SET key for 1 second → Select parameter M5 → Press the SET key → Select parameter M5.3)

Press the SET key.

or

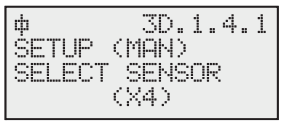


Menu structure of SE-46 sensor (D-MAX OI):
Select menu xy.5.3 *Simulate Analog Signals*
(Hardware Settings → Simulate Analog Signales)

Press the ENTER key

Note:
See *M5.3 Simulate Analog Signals, page 7-10* for additional information.

1.3. Calibrating the position signal on the DP-20

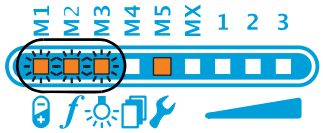


a. DP-20 web guide controller:
Select menu 3D.1.4.1 *Select Sensor*
(Manual → Basic → Calibration → Select Sensor)

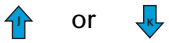
Select (X4) (line sensor - line centre ⌖)

Press the ENTER key

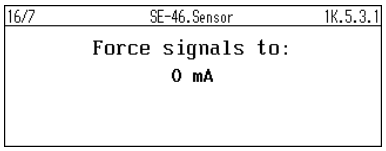
b. Sensor keyboard:
Press the Left Arrow key to select 0 mA

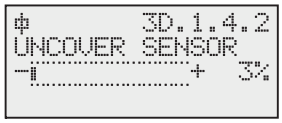


or



Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 0 mA

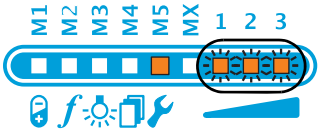




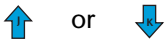
c. DP-20 web guide controller:
Determine the first reference value

Press the ENTER key

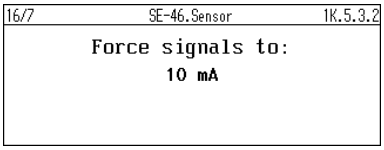
d. Sensor keyboard:
Press the Right Arrow key to select 10mA

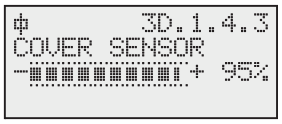


or



Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 10mA





e. DP-20 web guide controller:
Determine the second reference value

Press the ENTER key

The DP-20 web guide controller returns to the user area if the calibration was successful.

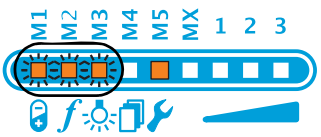
1.4. Calibrating the locking signal on the DP-20

a. DP-20 web guide controller:
Select menu 3E.1.4.1 *Select Sensor*
(Manual → Basic → Calibration → Select Sensor)

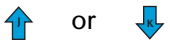
Select (X4) (line sensor - print or material edge)

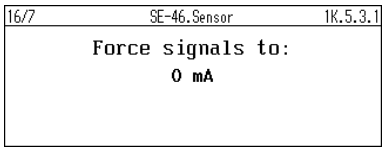
Press the ENTER key

b. Sensor keyboard:
Press the Left Arrow key to select 0mA

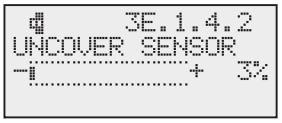


or





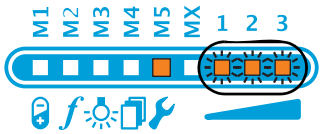
Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 0mA



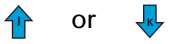
c. DP-20 web guide controller:
Determine the first reference value

Press the ENTER key

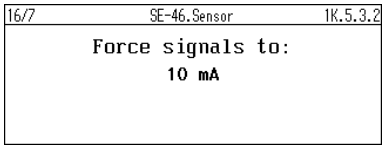
d. Sensor keyboard:
Press the Right Arrow key to select 10mA

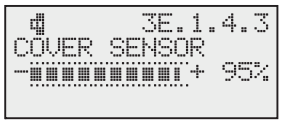


or



Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 10mA





e. DP-20 web guide controller:
Determine the second reference value

Press the ENTER key

The DP-20 web guide controller returns to the user area if the calibration was successful.

1.5. Exit menu M5.3 *Simulate Analog Signals* on the SE-46

a. Sensor keyboard:
Press the SET key to exit menu M5.3 *Simulate Analog Signals*

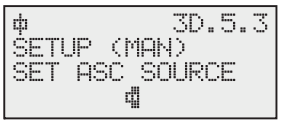
or

ESC H

Menu structure of SE-46 sensor (D-MAX OI):
Press and hold the ESC key until you reach the top level of the sensor

2. Setting the ASC (Automatic Sensor Control)

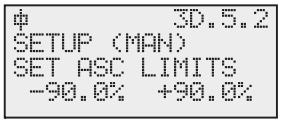
2.1. Selecting the ASC source



a. **DP-20 web guide controller:**
Select menu 3D.5.3
(Manual → Custom → ASC Source)

As *ASC source* select Line sensor - Line edge

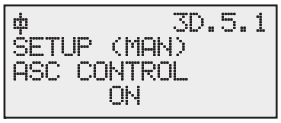
2.2. Setting ASC limits



a. **DP-20 web guide controller:**
Select menu 3D.5.2
(Manual → Custom → ASC Limits)

Set the values of the *ASC limits* to the range from –90% to +90%

2.3. Switching on ASC locking



a. **DP-20 web guide controller:**
Select menu 3D.5.1
(Manual → Custom → ASC Control)

Set the status of *ASC locking* to ON

3. Setting the polarity and gain

Note:
Settings must be made for sensor mode D - Line centre .

3.1. Setting the polarity

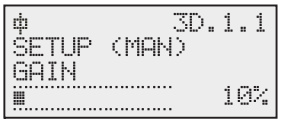
The guiding direction (polarity) must be checked depending on the mechanical installation direction of the system and adjusted if necessary.

a. **DP-20 web guide controller:**
Select menu 3D.1.3
(Manual → Basic → Guide Polarity)

Set the desired *polarity*

3.2. Setting gain

Gain must be set optimally.



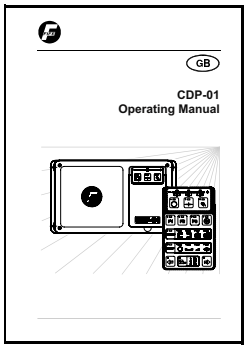
a. DP-20 web guide controller:
Select menu 3D.1.1
(Manual → Basic → Gain)

Set the *gain*

Operation

Note:
The DP-20 web guide controller must be operated in „Automatic“ mode with sensor mode D - Line centre ⟊.

CDP-01



Note:
Detailed information about sensor calibration is available in the "CDP-01 Operating Instructions". "Supplementary Operating Instructions“ may also be available.

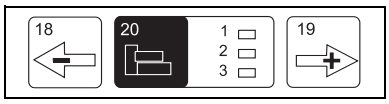
If the system documentation includes "Supplementary Operating Instructions" for the CDP-01, follow the sequence described in that manual for commissioning the CDP-01.

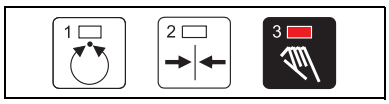
Precondition:
The SE-46 sensor is connected to the CDP-01 web guide controller on input X3. The calibration described here only applies to this input.

The SE-46 sensor can be operated via

- the sensor keyboard **or**
- a D-MAX operator interface (D-MAX OI).

1. Calibrating Analog signal inputs





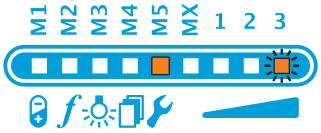
1.1. Preparing the CDP-01 for the calibration

a. **CDP-01 web guide controller:**
Press the drive selection key (20) to select the desired drive

b. **CDP-01 web guide controller:**
Press the Manual key (3) to set "Manual" mode on the CDP-01

1.2. Call menu M5.3 *Simulate Analog Signales* on the SE-46

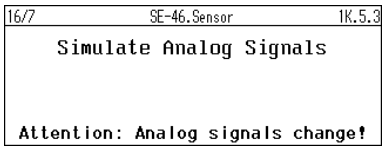
The analog signals required for the calibration are simulated by sensor SE-46.



a. **Sensor keyboard:**
Select menu M5.3 *Simulate Analog Signals*
(press the SET key for 1 second → Select parameter M5 → Press the SET key → Select parameter M5.3)

Press the SET key.

or

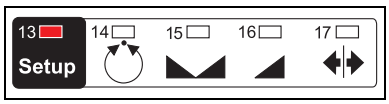


Menu structure of SE-46 sensor (D-MAX OI):
Select menu xy.5.3 *Simulate Analog Signales*
(Hardware settings → Simulate analog signals)

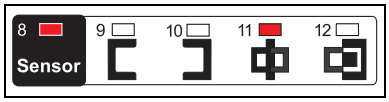
Press the ENTER key

Note:
See *M5.3 Simulate Analog Signals, page 7-10* for additional information.

1.3. Calibrating the position signal on the CDP-01

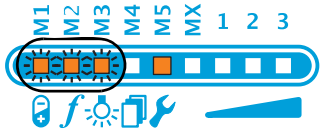


a. CDP-01 web guide controller:
Press the Setup key (13)

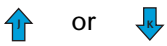


b. CDP-01 web guide controller:
Select the sensor for line guiding
Continue pressing the Sensor key (8) until LED 11 is lit

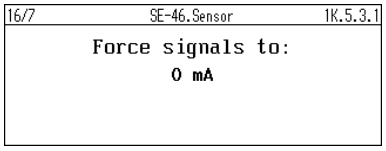
c. Sensor keyboard:
Press the Left Arrow key to select 0mA

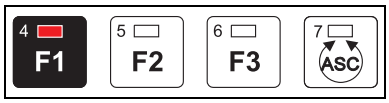


or



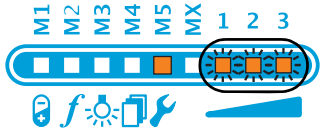
Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 0mA





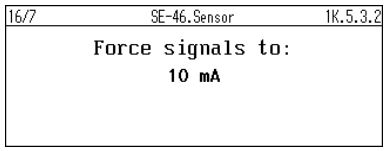
d. CDP-01 web guide controller:
Press the F1 key (4) to determine the first reference value

e. Sensor keyboard:
Press the Right Arrow key to select 10mA

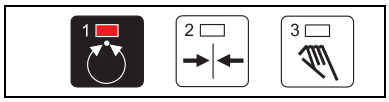


or

Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 10mA

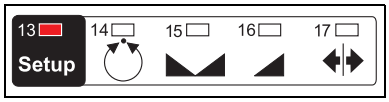


f. **CDP-01 web guide controller:**
Press the F2 key (5) to determine the second reference value

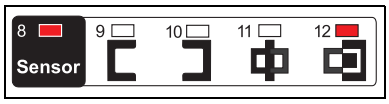


g. **CDP-01 web guide controller:**
Press the Automatic key (1) to save the calibration

1.4. Calibrating the locking signal on the CDP-01

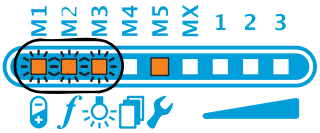


a. **CDP-01 web guide controller:**
Press the Setup key (13)



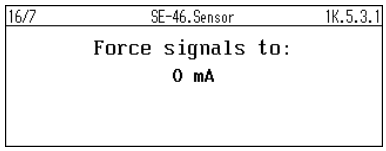
b. **CDP-01 web guide controller:**
Select the sensor for line guiding
Continue pressing the Sensor key (8) until LED 12 is lit

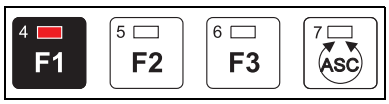
c. **Sensor keyboard:**
Press the Left Arrow key to select 0mA



or

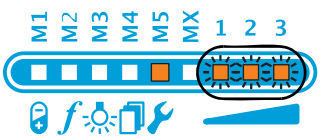
Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 0mA



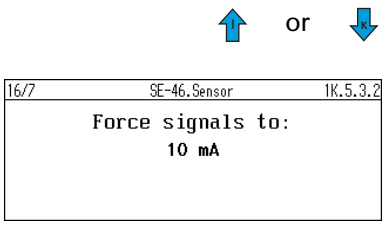


d. **CDP-01 web guide controller:**
Press the F1 key (4) to determine the first reference value

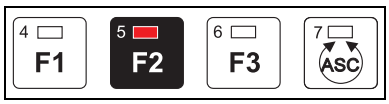
e. **Sensor keyboard:**
Press the Right Arrow key to select 10mA



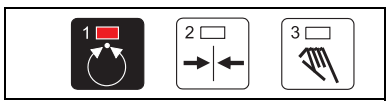
or



Menu structure of SE-46 sensor (D-MAX OI):
Use the arrow keys to select a signal assignment of 10mA



f. **CDP-01 web guide controller:**
Press the F2 key (5) to determine the second reference value



g. **CDP-01 web guide controller:**
Press the Automatic key (1) to save the calibration

1.5. Exit menu M5.3 *Simulate Analog Signals* on the SE-46

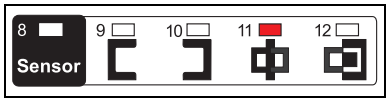
a. **Sensor keyboard:**
Press the SET key to exit menu M5.3 *Simulate analog signals*

or

Menu structure of SE-46 sensor (D-MAX OI):
Press and hold the ESC key until you reach the user level

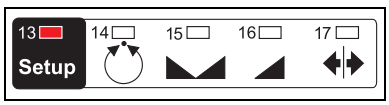
2. Setting the ASC (Automatic Sensor Control)

2.1. Sensor selection for line guiding

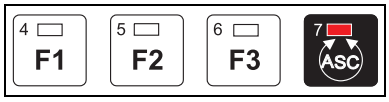


a. **CDP-01 web guide controller:**
Select the sensor for line guiding
Continue pressing the Sensor key (8) until LED 11 is lit

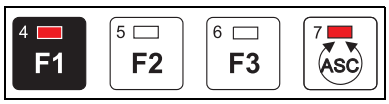
2.2. Setting ASC thresholds on the CDP-01



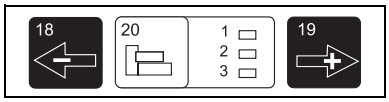
a. **CDP-01 web guide controller:**
Press the Setup key (13)



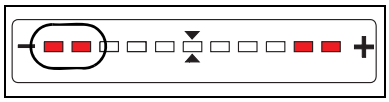
b. **CDP-01 web guide controller:**
Press the ASC key (7)

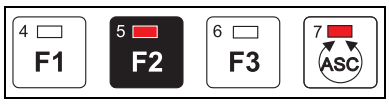


c. CDP-01 web guide controller:
Press the F1 key (4) to select the left ASC threshold

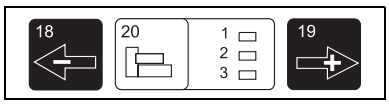


d. CDP-01 web guide controller:
Use the + or - key to set the left ASC threshold so that the first and second LED from the left on the LED bar are lit

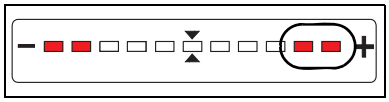


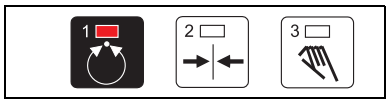


e. CDP-01 web guide controller:
Press the F2 key (4) to select the right ASC threshold



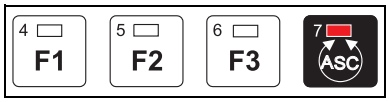
f. CDP-01 web guide controller:
Use the + or - key to set the right ASC threshold so that the first LED from the right on the LED bar is lit





g. CDP-01 web guide controller:
Press the Automatic key (1) to save the settings

2.3. Switching on the ASC function



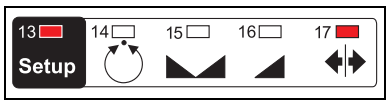
a. CDP-01 web guide controller:
Press the ASC key (7) to turn on the ASC function → LED 7 is lit

3. Setting the polarity and gain

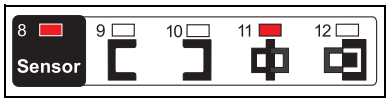
Note:
Settings must be made for sensor mode LED11 - Line centre.

3.1. Setting the polarity

The guiding direction (polarity) must be checked depending on the mechanical installation direction of the system and adjusted if necessary.



a. CDP-01 web guide controller:
Continue pressing the Setup key (13) until LED 17 is lit



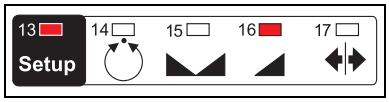
b. CDP-01 web guide controller:
Continue pressing the Sensor key (8) until LED 11 is lit

Set the desired *guiding direction*

Note:
Additional information may be found in the section entitled "Changing the Guide Direction" in the "CDP-01 Operating Instructions".

3.2. Setting the system gain

The system gain setting must be optimal.



a. CDP-01 web guide controller:
Continue pressing the Setup key (13) until LED 16 is lit

Set the desired *system gain*

Note:
Additional information may be found in the sections "Changing the System Gain with the web at Standstill" and "Changing the System Gain with the web in Motion" in the "CDP-01 Operating Instructions" .

Operation

Note:
The CDP-01 web guide controller must be operated in "Automatic" mode with sensor mode LED11 - Line centre.

6 OPERATION VIA SENSOR KEYBOARD

Precondition

Commissioning of the sensor must be performed as described in the relevant section of these Operating Instructions and must be completed successfully.

Safety instructions

While the sensor is in operation, the following safety instructions must be observed.

WARNING:
When the web guide controller to which the sensor is wired is in operation, there is danger of cutting on the material web and danger of crushing on the actuator.

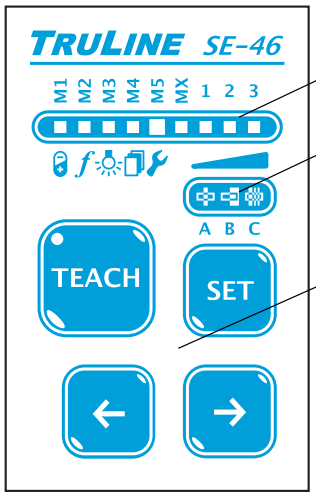
⇨ Therefore, do not reach onto or close to the material web or moving parts of the connected actuator.

WARNING:
If there is direct visual contact with the sensor lighting, there is danger of temporary blinding and accidents occurring as a result (see also page *2-3*).

⇨ Avoid direct visual contact with the sensor illumination.

User interface

Keys and their functions



1 LED display
2 LED display - sensor mode
3 Keypad

Fig. 6.1: User interface

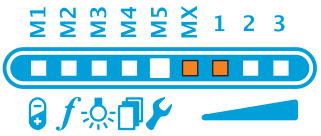
Fig. 6.1 shows the layout of the SE-46 sensor user interface. The sensor has four keys and two LED displays.

Key	Designation	Function
TEACH	TEACH key	– Performs a calibration – Confirm/save modified settings
SET	SET key	– Switch to menus – Exit menus without saving if the key is held for longer than 2seconds – Sensor mode selection during calibration
←	Left-Arrow key	– Navigating in menus – Adjusting parameters (-) – Selecting the reference on the material web during calibration
→	Right-Arrow key	– Navigating in menus – Adjusting parameters (+) – Selecting the reference on the material web during calibration

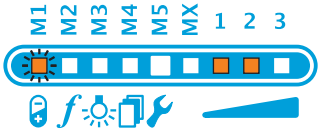
Displays

LED display

The LED display helps orient the user when the sensor is in operation. Two different functions are assigned to the display:



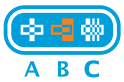
– During *operation* the LED display shows the currently detected position of the reference if the calibration was valid (the picture on the side shows an example of this) or lock information. The designations and symbols in the display have no meaning for this function.



– The current parameter is shown in the *menus* by LEDs M1 to MX. The value belonging to the parameter is shown by LEDs 1 to 3 (see Section *Parameter setting via sensor keyboard, page 7-1*).
An individual flashing LED (M1 in the example) is a prompt for an entry. A parameter can be selected (M1 to MX) or a parameter value can be changed (1 to 3).

  If the meaning of the LEDs is different, the relevant description of the selected menu describes the differences.

Sensor mode display



LEDs A, B and C indicate the sensor mode assigned to the active profile (in example B).
A - Line mode
B - Edge mode
C - Pattern mode
(see also *Sensor mode, page 6-6*).

Teach key LED

The LED of the TEACH key only flashes during the calibration process.

Target light

The target light (see 9 in *Fig. 1.1, page 1-2*) is a line of LEDs that make the following information on the material web available to the user outside the area lit by the sensor:

– as a tool for adjustments (see *M5.1 Distance Gauge, page 7-9*)

– As a selection of the reference on the material web during calibration

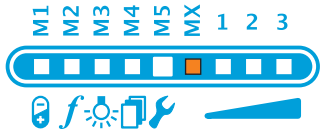
– To identify the position of the reference on the material

web during operation - corresponds to what appears in the LED display

The distance between the target light and the viewing area is 45 mm (see also A in *Fig. 1.2, page 1-3*).

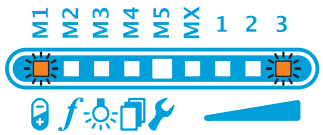
SE-46 operation states

Three operation states must be distinguished when the SE-46 is in operation:



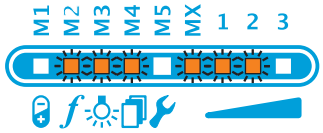
Calibration valid - reference detected

If the reference was recognised, the position of the reference appears in the LED display of the sensor and in the target light. The web guide controller will attempt to control the reference that was found to the target position, usually the centre of the LED display.



Calibration valid - reference not detected

If the reference is not in the sensor field of view, control is locked. LEDs M1 and 3 flash in the sensor's display.



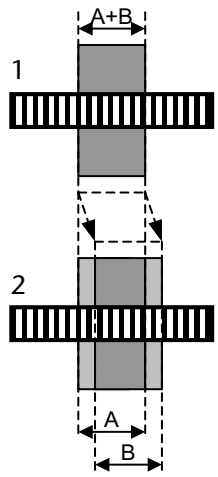
Calibration invalid

If no calibration has been performed yet on the sensor or the sensor was unable to perform the calibration successfully with the assigned parameters and ambient conditions, the LEDs identified in the screen flash in the display.

Instructions for calibration

Select a suitable reference

Since the SE-46 scans the material by lines, the sensor records only a small segment of the entire printed image during calibration. If there are no clear reference marks or guiding lines, the operator must select a suitable reference (a line, transition in contrast or pattern) that can be unambiguously identified within the sensor field of view. Care must be taken to ensure no additional patterns similar



1 Reference during calibration: colours A and B one over the other
2 Modified reference during print

Fig. 6.2: Multi-colour patterns as reference

to the reference are encountered, as this could have a negative result on material guiding.

If multicoloured patterns are used as a reference, note that drifting of the individual colours may occur during the printing process. This may result in a lost reference in some circumstances when the overlapping of patterns no longer produces the same transition in contrast. Example 2 in *Fig 6.2* shows how the drift away from colour B results in a modified reference that is no longer recognised by the sensor. In such cases it is better to select a single colour (primary colour) as the reference. It can then be considered the reference colour. Then material guiding will be independent of individual print registers.

Scan frequency

f

The setting for the scan frequency of the SE-46 sensor depends on the following factors:

- Speed of the material web
- Length of the reference (with references interrupted)
- Contrast intensity/brightness of the reference
- Required colour selectivity (RGB mode)

The sensor scans the material web by lines. The speed of the material web and the setting selected for the scan frequency determine the optical resolution of the sensor in the direction in which the web is running. The minimum detectable reference length can be determined from the optical resolution.

The sensor combines information from up to three colour channels (Red, Green and Blue) makes it possible to recognise colours with the aid of internal lighting. Colour processing runs sequentially. The sensor requires more scanning time for a greater colour distinction and therefore a lower setting for the scan frequency.

If the reference is interrupted, the setting of the scan frequency is based on the reference length. If the sensor must distinguish the colour of the reference from similar patterns or the contrast and/or brightness of the reference is

insufficient, a lower setting of the scan frequency must be selected. High settings of the scan frequency cannot be used with unambiguous scanning conditions (for example strong contrast, no possibility of confusion).

A diagram in Appendix B (see *14-1*) provides help for making the setting of the scan frequency.

Note:
The scan frequency is selected before a calibration is performed. If a change is made to the scan frequency, calibration must be repeated.

Sensor mode

Sensor SE-46 supports 3 sensor modes that are optimised for the areas of emphasis of applications listed here. Examples of possible application cases are described starting on page *9-1*.

Line mode (A)

The line mode of the SE-46 is especially suitable for lines that are defined as a constant level of brightness or colour with two sharply defined, adjacent and contrasting transitions. The line width may range from 0.5 mm to 20 mm. The line must run parallel to the direction in which the web is running. If there are breaks in the line, the line must have a minimum length depending on the selected scan frequency f and a maximum material speed.

Edge mode (B)

The edge mode of the SE-46 searches selectively for a transition in contrast or colour. The edge must run parallel to the direction in which the web is running. If there are breaks in the edge, the edge must have a minimum length depending on the selected scan frequency f and a maximum material speed.

Pattern mode (C)

Pattern mode uses an arrangement of lines as a uniquely coded position mark on the material web (e.g. barcodes). The lines must run parallel to the direction in which the web is running. They must also have a minimum length depending on the selected scan frequency f and a maximum material speed.

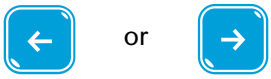
Calibration of the SE-46

- Setting the scan frequency
  see menu *M2 Scan Frequency, page 7-3*

- Press the TEACH key to start the calibration process
  If a valid calibration is already active, hold the TEACH key down for 2 seconds.
  The LED of the TEACH key and the LED of the currently set sensor mode start to flash.

- Select the sensor mode with the SET key if another sensor mode is required

- The reference must be moved to the centre of the sensor field of view for the calibration process in line or edge mode. To do this, the material web must be moved.

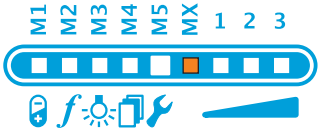


It is also possible to assign the line centre or edge position of the selected reference with the arrow keys without having to move the material.

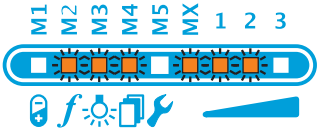
The width of the pattern can be adjusted with the arrow keys in pattern mode for the calibration.

The results appear in the target light.

- The actual calibration process is started with the TEACH key. The sensor will now learn the selected reference. This process may last several seconds.



If calibration was successful, the sensor switches back to normal operation. The target light points at the position of the reference if it is in the field of view.

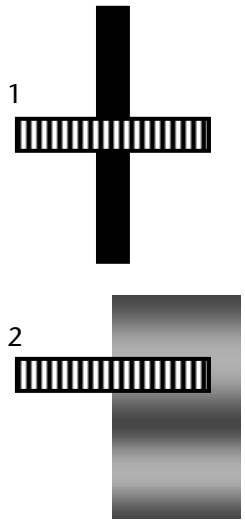


If the calibration failed, lighting is turned off and the message "Calibration invalid" appears in the LED display of the sensor. Sensor calibration must be repeated with better adapted parameters and ambient conditions.

Enhanced functionality

Deviation Tolerance

The *deviation tolerance* of the SE-46 sensor indicates the degree to which the current information in the sensor field of view must match the calibrated reference in order to generate a valid sensor signal (see also menu *M1 Deviation Tolerance, page 7-2*).



1 Low deviation tolerance
2 High deviation tolerance

Fig. 6.3: Deviation Tolerance

A low deviation tolerance (example 1 in *Fig 6.3*) requires a very high match level to the template of the calibrated reference. A low deviation tolerance (example 2) permits greater deviations in brightness or colour, but is also more prone to errors when evaluating similar position marks. This can result in loss of the control point. The recommended setting is "Medium" (see table *Deviation Tolerance, page 7-2*).

Note:
The setting of the deviation tolerance can be adjusted while the material web is running. The change takes effect immediately. This is useful for checking to ensure the setting is correct.

Active Profile

The SE-46 sensor offers the option of saving more than one profile. A profile contains

- the parameters that were determined during calibration and
- the parameters that were set when the profile was applied.

The user can load another setting for the sensor by switching the active profile and continue working immediately with that reference. The settings of continually recurring references (for example when the material changes frequently) can be reused without having to perform calibration again.

Note:
The active profile is selected before a new calibration is performed (see *M4 Active Profile, page 7-6*).

Interrupted reference

Generally there is no limit for the ratio between the length of the reference and the length of the interruption. The reference must contain at least the minimum length depending on the scan frequency setting.

Please note, however, that if the position mark is lost, the sensor may respond to similar patterns in the printed image, thereby destabilising control. In addition, control is not active in areas that have no reference. This may have a negative effect on control dynamics in some cases.

Active field of view

For many applications with an interrupted reference, the wide field of view - 30mm - may be a disadvantage. In areas between two reference marks the sensor may respond to similar patterns, thereby destabilising control.

In this case the active field of view of the SE-46 can be reduced to exclude similar marks off to the side of the desired reference. The active field of view can be reduced to as little as 4mm. It is always positioned at the centre of the sensor field of view.

Note:
Please note that the target position assignment of the controller must be servo-centred. The target position of the reference can also be positioned outside the active field of view. This can make control impossible.

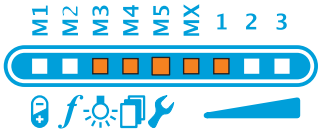
Examples of how to use the active field of view are shown on pages *9-2* and *9-3*.

7 PARAMETER SETTING VIA SENSOR KEYBOARD

Notes

This section describes how to set the parameters of the SE-46 using the keyboard on the sensor.

All parameters can also be set by an optional D-MAX OI (Operator Interface) (see Section *The D-MAX operator interface is used for control, page 8-1*).
There are no priorities between operation on the sensor and on the D-MAX operator interface. However, the keyboard of the SE-46 is locked if the D-MAX Operator Interface OI is in a menu item that is not present in the menu structure of the sensor.



This status of the sensors is represented by the LED display. To re-enable operation on the keyboard of the sensor, exit the relevant menu item on the D-MAX operator interface.

Menu structure

An overview of the sensor's menu structure may be found in *Appendix A - Menu structure, page 13-1*.

The menu structure of the SE-46 consists of

- the operating sequence for calibration (see *Page 6-7*) and
- the operating sequence for settings of parameters.

The operating sequences can be reached from any operating state. After an entry is completed, the system returns to one of the three operating states of the sensor.

To cancel the entry at any point in the menu structure, press and hold the SET key for more than 2 seconds. The old parameter settings remain intact.

M1 Deviation Tolerance

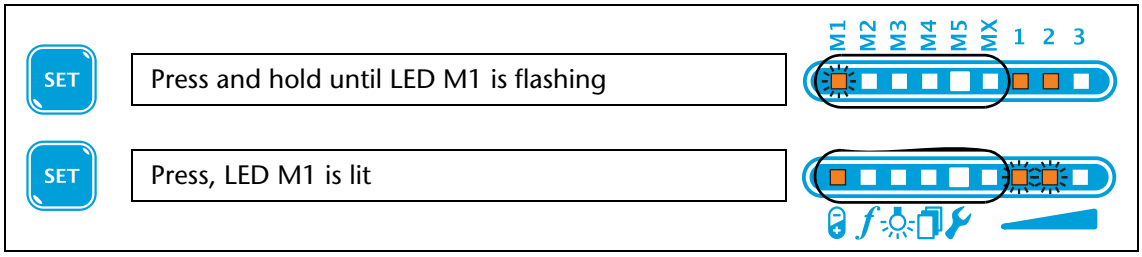
Description

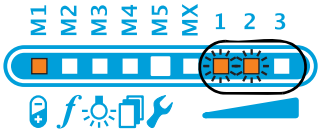
The *Deviation Tolerance* parameter of the SE-46 indicates how completely the current information in the sensor field of view must agree with the calibrated reference to generate a valid sensor signal (see also *Deviation Tolerance, page 6-8*).

Note:
The value of deviation tolerance can be adjusted without having to recalibrate the sensor.

Menu

- Key sequence for menu:

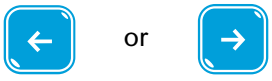




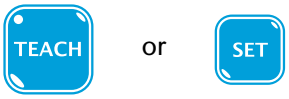
The LED or LEDs of the current setting for the *Deviation Tolerance* parameter is/are flashing.

1	2	3	Deviation Tolerance
■	□	□	Very low
■	■	□	Low
□	■	□	Medium
□	■	■	High
□	□	■	Very high

Input



- Reduce or increase the deviation tolerance with the arrow keys



- Save the entry with the TEACH key

  or

  Press the SET key for 2seconds to cancel

M2 Scan Frequency

Description

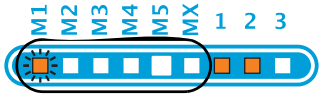
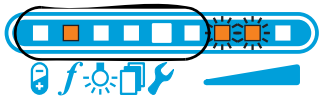
The *Scan Frequency* parameter is used to define a time window for determining a valid position value (see also *Scan frequency, page 6-5*).

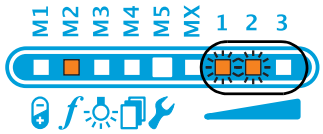
Scan frequency diagram:
The scan frequency diagram is used to facilitate selection of the optimum setting (see Appendix B *Page 14-1*). This diagram contains proposed parameter values for the scan frequency depending on the maximum material speed and the reference length.

Note:
The scan frequency is selected before a calibration is performed. If the scan frequency changes, the calibration must be repeated.

Menu

- Key sequence for menu:

SET	Press and hold until LED M1 is flashing	
→	Press repeatedly until LED M2 is flashing	
SET	Press, LED M2 is lit	



The LED or LEDs of the current setting for the *Scan Frequency* parameter is/are flashing.

1	2	3	Scan Frequency
■	□	□	Low
■	■	□	Normal
□	■	□	Medium
□	■	■	High
□	□	■	Extreme

Input

or

- Reduce or increase the scan frequency with the arrow keys

or

- Save the entry with the TEACH key

  or

  Press the SET key for 2 seconds to cancel

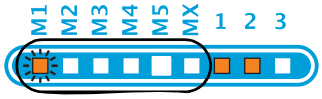
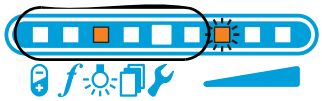
M3 Type of Illumination

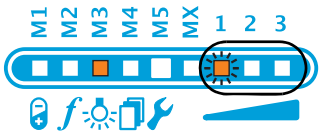
Description

The *Type of Illumination* parameter can be used to select between standard illumination (RGB) and other types of illumination.

Menu

- Key sequence for menu:

SET	Press and hold until LED M1 is flashing	
→	Press repeatedly until LED M3 is flashing	
SET	Press, LED M3 is lit	



The LED of the current setting for the *Type of Illumination* parameter is flashing.

1	2	3	Type of Illumination
■	□	□	RGB standard illumination (internal) for applications with light striking the surface
□	□	■	External illumination for applications with light passing through requires an external light source. Internal illumination is turned off.

Input

← or →

- Select the desired type of illumination with the arrow keys

TEACH or SET

- Save the entry with the TEACH key

  or

  Press the SET key for 2seconds to cancel

M4 Active Profile

Description

This parameter is used to select the active profile.

The settings of a continually recurring reference can thus be used again without having to perform an additional calibration. The sensor permits a selection from 3 fixed and 2 additional profiles.

Each profile contains:

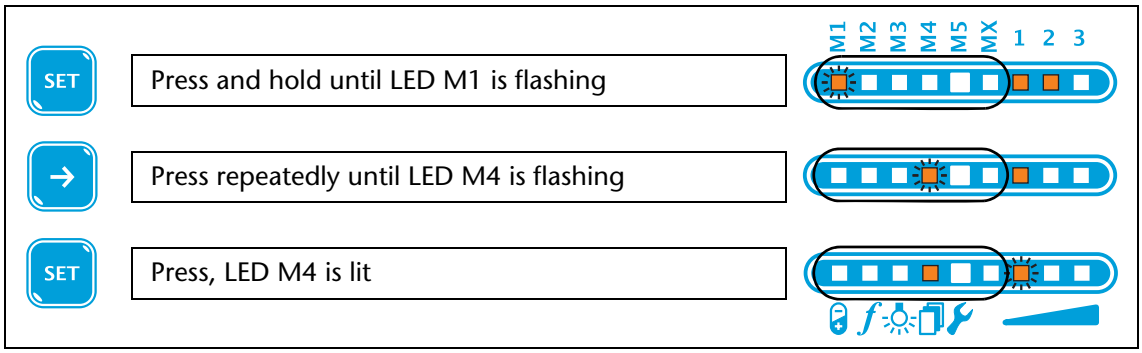
A. the parameters that were determined during calibration
   - the programmed reference
   - Sensor mode
   - Scan Frequency
   - Type of Illumination

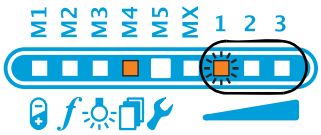
B. the parameters that were set when the profile was applied
   - Deviation Tolerance
   - Active Field of View
   - Automatic monitoring

Note:
If an already existing profile is calibrated successfully again, the values of parameters (see item A) that were determined during the previous calibration are permanently lost!

Menu

- Key sequence for menu:


SET
Press and hold until LED M1 is flashing
M1 M2 M3 M4 M5 MX 1 2 3
Press repeatedly until LED M4 is flashing
SET
Press, LED M4 is lit



The LED or LEDs of the current setting for the *active profile* parameter is/are flashing.

1	2	3	Active Profile
■	□	□	
■	■	□	Optional
□	■	□	
□	■	■	Optional
□	□	■	

Input

or

- Select the desired profile with the arrow keys

or

- Save the entry with the TEACH key

  or

  Press the SET key for 2seconds to cancel

M5 Hardware Settings

The hardware settings are used

- to adjust the sensor mechanically and
- to adjust the web guide controller used in the system to the analog signals of the sensor

The following menus are available for hardware settings:

- M5.1 Distance Gauge
- M5.3 Simulate Analog Signals

M5.1 Distance Gauge

Description

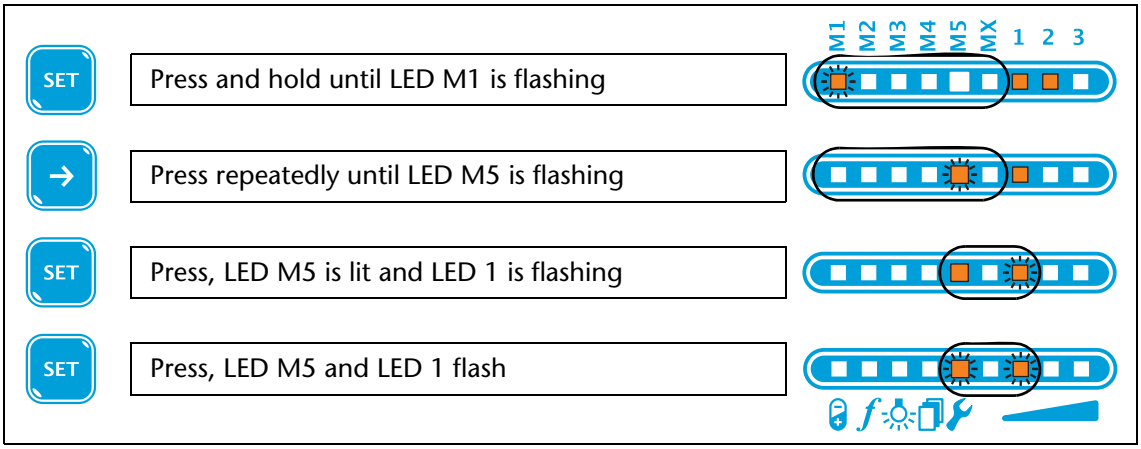
The *Distance Gauge* menu is used to adjust the distance between the sensor and material web during the mechanical adjustment of sensor SE-46.

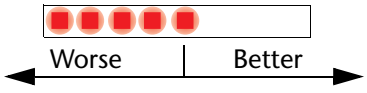
A strong contrast is required for the template. A black line on white paper is optimal for this purpose. The template must be

- positioned in the centre of the sensor field of view
- aligned in the direction in which the web is running and
- flush on the surface of the material web so that there are no differences in height.

Menu

Key sequence for menu:


SET
Press and hold until LED M1 is flashing
M1 M2 M3 M4 M5 MX 1 2 3
Press repeatedly until LED M5 is flashing
SET
Press, LED M5 is lit and LED 1 is flashing
SET
Press, LED M5 and LED 1 flash



A bar appears in the target light that evaluates the current distance.

Now the distance from the sensor to the material web must be adjusted mechanically so that the bar in the target light reaches a maximum.

If the sensor can be shifted mechanically, the distance that is determined should generate a maximum over the entire shift range. If there are large deviations here, check the mounting (rectangular bar).

- Exit the menu

M5.3 Simulate Analog Signals

Description

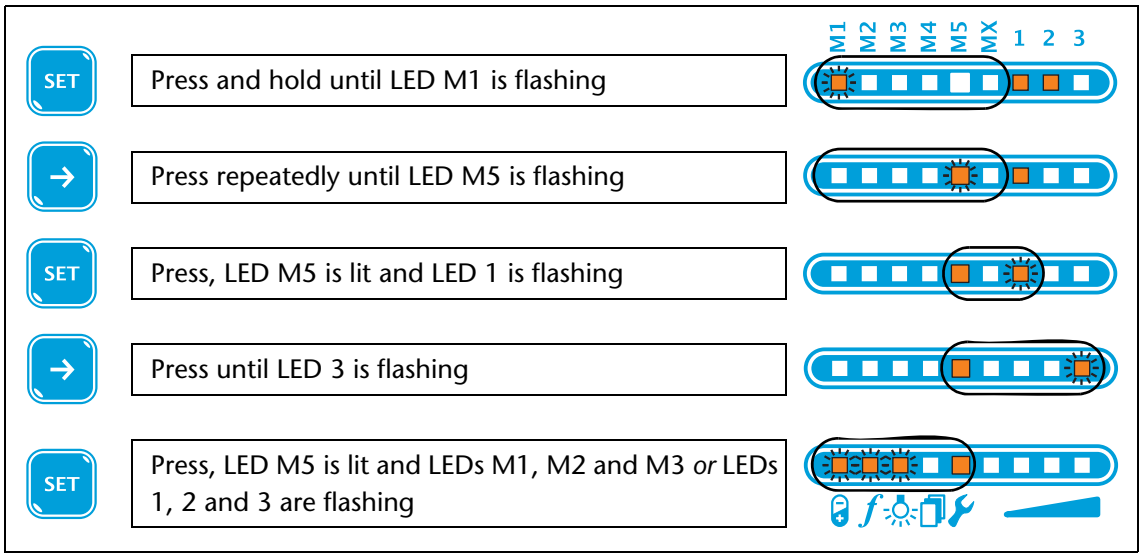
If a web guide controller processes the analog guiding signals of the sensor, the web guide controller must be checked and adjusted if necessary during commissioning or after a component is replaced (SE-46, cable or web guide controller).

Note:
The devices have already been preset and checked in the factory when they are delivered for the customer application.

However, this does not apply to replacement part deliveries.

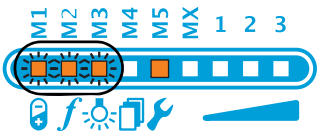
Menu

- Key sequence for menu:


SET
Press and hold until LED M1 is flashing
M1 M2 M3 M4 M5 MX 1 2 3
Press repeatedly until LED M5 is flashing
SET
Press, LED M5 is lit and LED 1 is flashing
Press until LED 3 is flashing
SET
Press, LED M5 is lit and LEDs M1, M2 and M3 *or* LEDs 1, 2 and 3 are flashing

Setting

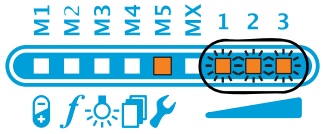
- Press the 'Left-Arrow' key



LEDs M1, M2 and M3 flash. Sensor SE-46 sends 0 mA to both signal outputs.

- The calibration of analog signal inputs must be performed according to the information about the relevant web guide controller in Section *Commissioning of the SE-46 sensor*.

- Press the 'Right-Arrow' key



LEDs 1, 2 and 3 flash. Sensor SE-46 sends 10 mA to both signal outputs.

- The calibration of analog signal inputs must be performed according to the information about the relevant web guide controller in Section *Commissioning of the SE-46 sensor*.

- Exit the menu

MX menus

The following menus are available for additional settings:

- MX.1 - Active Field of View
- MX.2 - Profile Switching activated?

MX.1 - Active Field of View

Note:
The menu is present starting at firmware number ... - 004.

Description

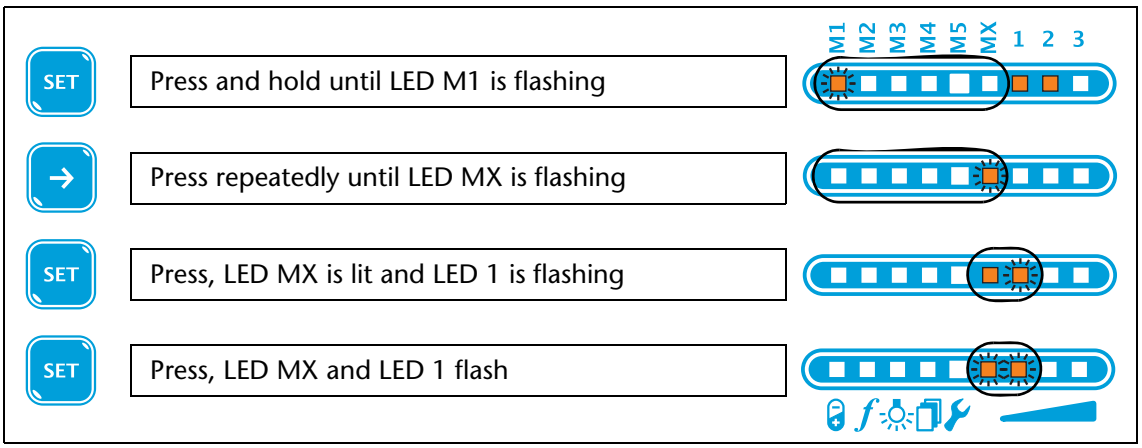
The parameter for *Active Field of View* is used to set the range in which the sensor should recognise the reference.

Maximum value: 30 mm
Minimum value: 4 mm

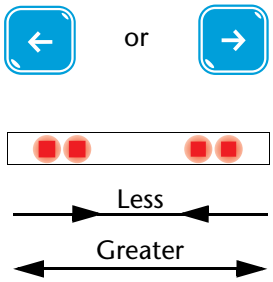
Note:
The active field of view is always centred in the sensor field of view.

Menu

- Key sequence for menu:


SET
Press and hold until LED M1 is flashing
Press repeatedly until LED MX is flashing
SET
Press, LED MX is lit and LED 1 is flashing
SET
Press, LED MX and LED 1 flash
M1 M2 M3 M4 M5 MX 1 2 3

Input



- Increase or reduce the active field of view with the arrow keys

The size of the active area is represented in the target light by lit LEDs.

or

- Save the entry with the TEACH key

  or

  Press the SET key for 2 seconds to cancel

MX.2 - Profile Switching activated ?

Note:
The menu is present starting at firmware number ... - 004.

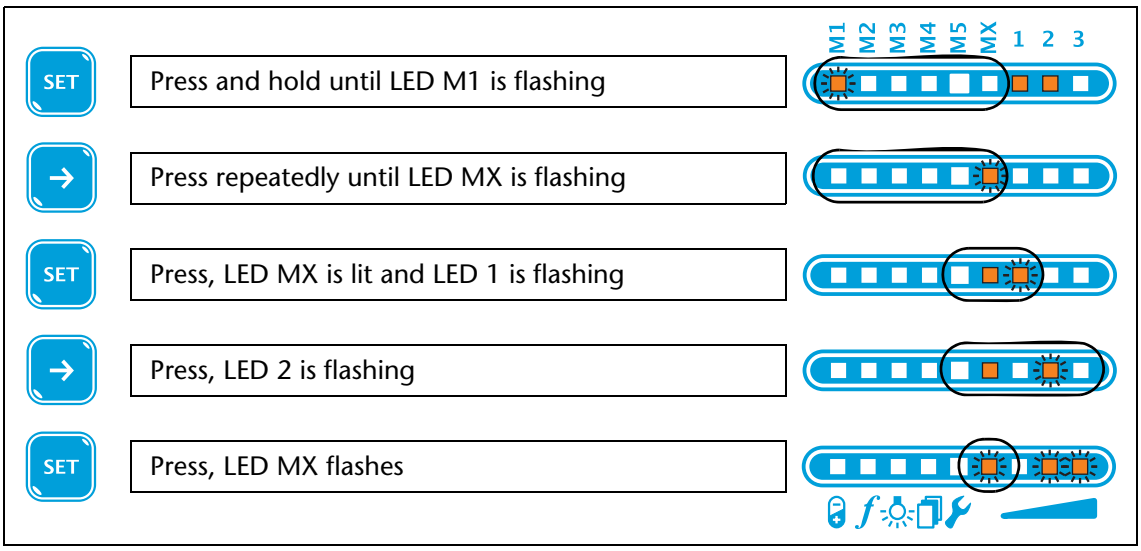
Description

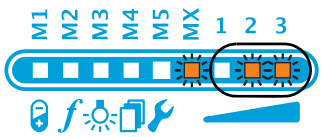
The parameter *Profile Switching activated ?* is used to define whether the sensor will use a fallback profile if the reference of the currently used profile is lost. This fallback profile will guide the material web until the sensor has found the original reference again.

Note:
The settings of parameters *Alternate Profile* and *Profile Switching Delay* required to use profile switching are only possible via the D-MAX operator interface.

Menu

- Key sequence for menu:


SET
Press and hold until LED M1 is flashing
M1 M2 M3 M4 M5 MX 1 2 3
Press repeatedly until LED MX is flashing
SET
Press, LED MX is lit and LED 1 is flashing
Press, LED 2 is flashing
SET
Press, LED MX flashes



The LEDs of the current setting of the *Profile Switching activated ?* parameter are flashing.

1	2	3	Profile Switching activated ?
■	■	□	No
□	■	■	Yes

Input

or

- Select the desired setting with the arrow keys

or

- Save the entry with the TEACH key

  or

  Press the SET key for 2 seconds to cancel

8 THE D-MAX OPERATOR INTERFACE IS USED FOR CONTROL

Notes

This section describes only the operation of the SE-46 via a D-MAX operator interface.

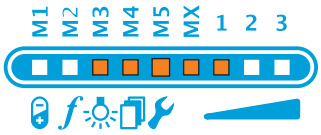
Note:
The following section is a supplementary description of the D-MAX operator interface containing information about how to set up the SE-46 sensor via the D-MAX operator interface.

WARNING:
All safety instructions as well as information on installation, operation, and maintenance of the D-MAX operator interface can be found in the "D-MAX" operating instructions.

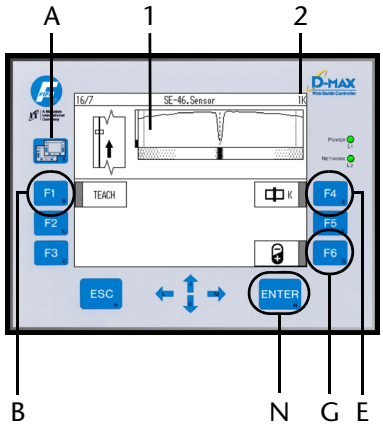
Priority of keyboard and displays

The display and operation of the sensor keyboard are parallel to the display and keypad of the D-MAX operator interface. There are no priorities between the keyboards. The first operation to be received by the sensor will be performed.

Because of the options the D-MAX operator interface offers due to its design, however, some parameters are found more readily in that menu structure than in the control tree of the sensor.
If the D-MAX operator interface is in a menu that is not present in the control tree of the sensor, that will be indicated accordingly in the sensor's LED display and the sensor keyboard will be locked.



Top level



All control functions required for normal operation of the SE-46 sensor are available on the top level of the D-MAX operator interface:

- A Selection of "devices"
- B Teach key
- E Select profile
- G Deviation tolerance menu (see *Page 6-8*)
- N Switch to menu structure

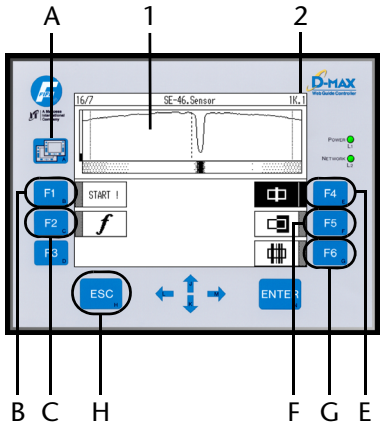
- 1 Signal display
- 2 Menu identification

Calibration of the SE-46

Note:
Information about the calibration of the SE-46 may be found in section *Instructions for calibration, page 6-4*.

Calibration of the SE-46 is started from the top level of the D-MAX operator interface.

- Press the F1 key to start the calibration process



All control functions for a calibration are now available:

- A Selection of "devices"
- B Start of the actual calibration process
- C Scan frequency menu
- E Selection of sensor mode Line mode A
- F Selection of sensor mode Edge mode B
- G Selection of sensor mode Pattern mode C
- H Exit this level without starting the calibration

- 1 Signal display
- 2 Menu identification

The "Rollback" function is only assigned to the F3 key if specific preconditions are met - see also *Error message when exiting a menu, page 11-5*.

D-MAX menu of the SE-46

Note:
Information about how to operate the menus of the D-MAX operator interface may be found in the "D-MAX" operating instructions.

Menu structure

Section *Appendix C - Menu structure of D-MAX, page 15-1* contains an overview of all menus of the D-MAX operator interface related to the SE-46 sensor.

Menu identification

Each sensor menu of the D-MAX operator interface has its own identification. Therefore every step in the menu structure for the SE-46 is precisely retraceable.

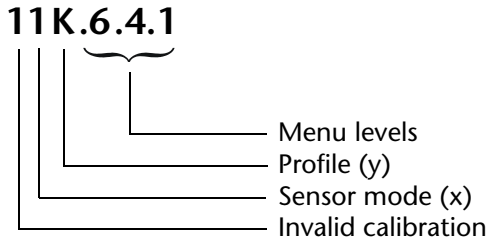


Fig. 8.1: Menu identification

Invalid calibration: 1 - identifies an invalid calibration

- if a calibration is invalid this position is not assigned

Sensor mode (x): 1 - Line mode A

2 - Edge mode B

3 - Pattern mode C

Profile (y): K, L, M, N and O possible

Menu levels: Identifies the position of a menu within the structure

9 APPLICATION EXAMPLES

Edges of printed images

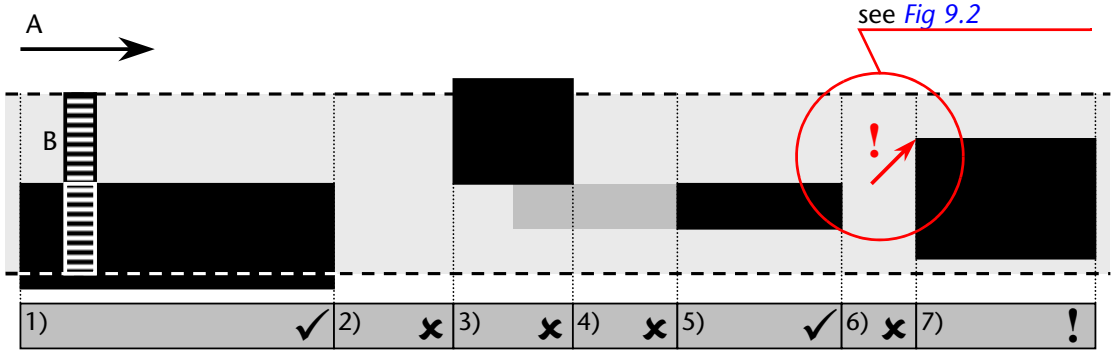
For example, the edge of a printed image might be the outer edge of a printed image or a striking longitudinal colour contrast.

A B C

The edge of a printed image should be calibrated with sensor mode 'B - Edge mode'.

Example

Fig 9.1 shows an example with a calibrated black/white contrast at the position of the proposed field of view.

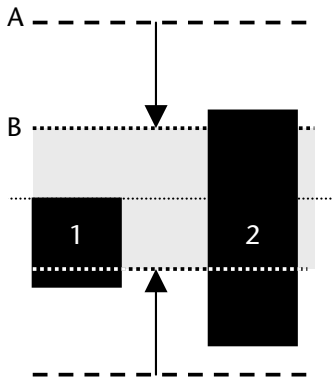


A Web running direction
B Sensor field of view

1	Clean scanning of edge of printed image	Guiding active
2	No position signal present	Locking active
3	Same contrast, but wrong polarity	Locking active
4	Contrast transition deviates too much	Locking active
5	Clean scanning of edge of printed image	Guiding active
6	No position signal present	Locking active
7	Please note! Same contrast transition, but invalid position	Guiding fault!

Fig. 9.1: Edges of printed images

The SE-46 sensor detects a valid position information item (1 and 5) at each of the positions on the continuous material web where the black/white contrast in the field of view is the same as the previously calibrated reference. Reverse contrast transitions (3) and transitions with contrasts of fluctuating intensity (4) are ignored by the sensor and will lock guiding.



A Sensor field of view
B Active field of view

1 Valid position signal
2 Wrong edge of printed image

Fig. 9.2: Active field of view

After sections without a position signal (6), the sensor is sensitive to other edges of printed images (7). When the edge of printed image is offset in the field of view, the sensor recognises this contrast transition as valid, resulting in a guiding fault.

To prevent incorrect position marks from being detected, the active field of view of the sensors can be limited. In the example in *Fig 9.2*, the incorrect edge of printed image (2) now lies outside the active field of view and thus does not interfere with guiding.

To ensure problem-free guiding, make certain the edge of the printed image you use is clearly recognisable along the entire course of the image and cannot lead to any incorrect position recognition.

Guiding lines

A guiding line is a continuous reference for the entire material web. Usually it has a sufficiently strong contrast and cannot be confused with the area surrounding it, making it possible to work at a high scan frequency.

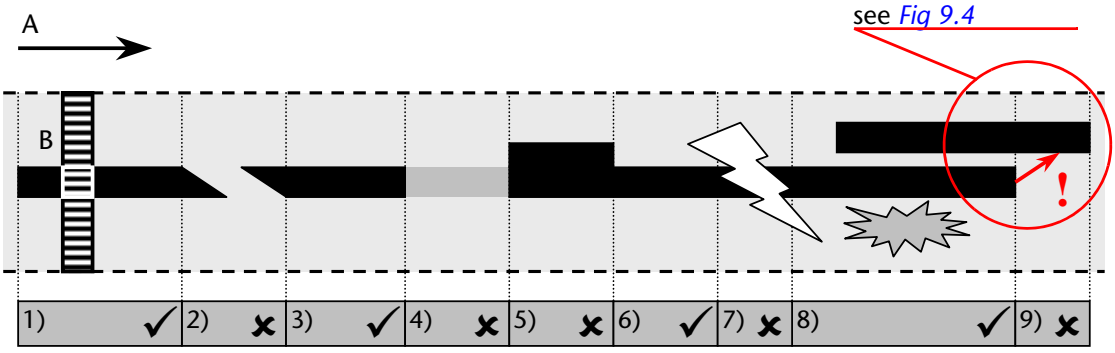
The edge of a printed image should be calibrated with sensor mode 'A - Line mode'.

Example

Fig 9.3 shows an example with a calibrated guiding line at the position of the proposed field of view.

The SE-46 sensor recognises a valid position information item (1, 3, 6 and 8), at the places on the continuous material web where the calibrated guiding line reappears with the same line width and contrast intensity. Transitions with reverse or deviating contrast (4) and lines of deviating width (5) are ignored by the sensor and cause guiding to be locked.

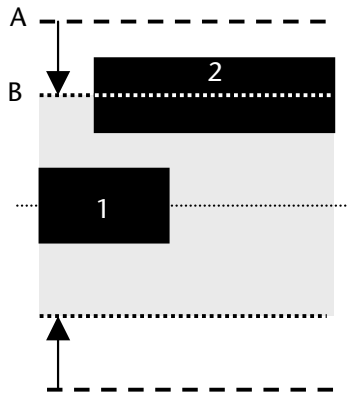
Adjacent patterns (8) will not cause any interference in position recognition.



A Web running direction
B Sensor field of view

1	Clean scanning of guiding line	Guiding active
2	No position signal present	Locking active
3	Clean scanning of guiding line	Guiding active
4	Contrast transition deviates too much	Locking active
5	Width of guiding line deviates	Locking active
6	Clean scanning of edge of printed image	Guiding active
7	Guiding line fault	Locking active
8	Clean scanning of guiding line (no fault due to adjacent print)	Guiding active
9	Please note! Same line, but invalid position	Guiding fault!

Fig. 9.3: Guiding lines



A Sensor field of view
B Active field of view

1 Valid position signal
2 incorrect guiding line

Fig. 9.4: Active field of view

In sections without position signal (9 - *Fig 9.3*) the sensor is sensitive to other guiding lines. If a guiding line is offset in the field of view, the sensor will detect the wrong line as valid, which will interfere with guiding.

To prevent incorrect position marks from being detected, the active field of view of the sensors can be limited. In the example in *Fig 9.4*, the incorrect guiding line (2) now lies outside the active field of view and thus does not interfere with guiding.

Complex patterns as guiding lines

If no suitable guiding lines are available, printed patterns can be used as a reference. These patterns must be very short and must be widely spaced relative to their length.

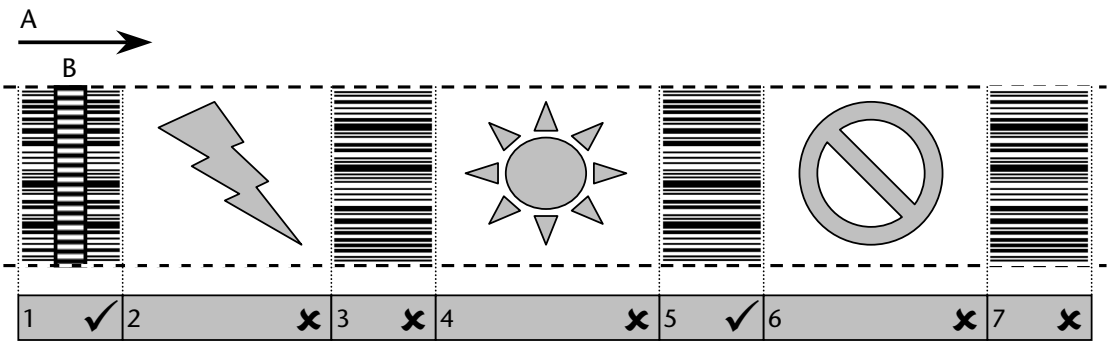
A pattern as the term is used here is an arrangement of lines and/or edges extending in the direction in which the web is running which provides a mark that cannot be confused because of the sequence of individual contrast transitions.

A B C

The edge of a printed image should be calibrated with sensor mode 'C - Pattern mode'.

Example

Fig 9.5 shows the barcode as a frequently occurring example of complex patterns.



A Web running direction
B Sensor field of view

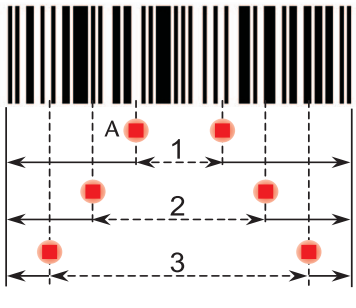
1	Clean scanning of the pattern	Guiding active
2	Deviating pattern	Locking active
3	Pattern only similar	Locking active
4	Deviating pattern	Locking active
5	Clean scanning of the pattern	Guiding active
6	Deviating pattern	Locking active
7	Pattern only similar	Locking active

Fig. 9.5: Complex patterns

The SE-46 sensor detects a valid position information item (1 and 5), at places along the continuous material web where precisely the calibrated pattern reappears. Other patters (2, 4 and 6) and other similar patterns as well (3 and 7) are ignored by the sensor and guiding is locked.

The high processing speed of the SE-46 makes it possible to recognise short 10mm patterns at the highest scan frequency setting at a web speed of up to 1500m/min (see *Appendix B - Scan frequency diagram, page 14-1*).

Setting the width of the reference pattern



A Target light

Fig. 9.6: Offset range

During the calibration process, the user can use the arrow keys to determine which area of the pattern will be saved in the sensor field of view as a reference. This setting indirectly affects the size of the offset range. The greater the width of the selected reference pattern (example 3 - *Fig 9.6*), the more reliably the pattern can be recognised and the smaller the offset range of the material web.

Numbering in *Fig 9.6*	Width of reference pattern	Offset range
1	Minimum	Maximum
2	Medium	Medium
3	Maximum	Minimum

This setting offers the possibility of preassigning the valid range of the reference pattern for narrow patterns. The reference must be centred in the sensor field of view. Then non-relevant contrast information will not be saved with the calibration.

Note:
We recommend using a D-MAX operator interface for more precise calibration. The reference width setting is based on image information from the imager of the SE-46.

Half the width of the field of view is assigned as a default. This makes it possible to offset the material by about +/-8mm before the first pattern information comes out of the field of view.

Print marks

Print marks provide an alternative to guiding lines. The same print marks can also be used as a reference for position guiding.

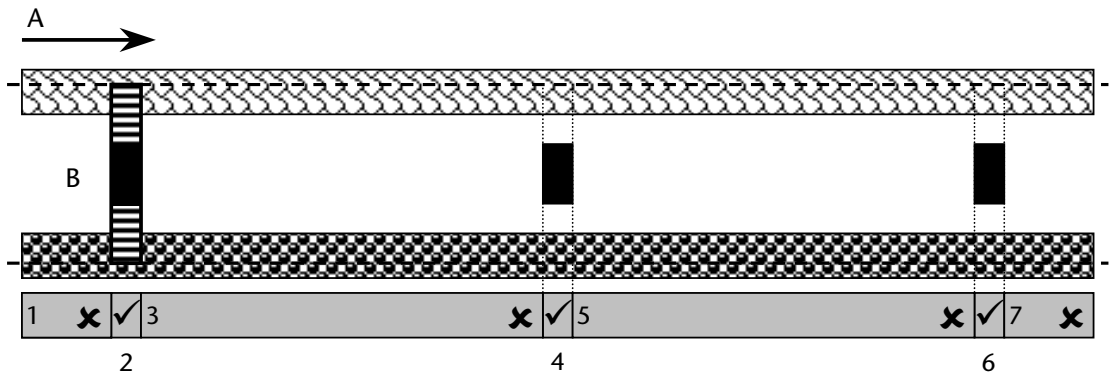
Print marks in the form of monochromatic rectangles can be programmed in any sensor mode.

A B C

– If the surface of the print marks is uniform, use of sensor mode 'A - Line mode' is recommended.

A B C

– Otherwise only one of the two edges can be calibrated in sensor mode 'B - Edge mode'.



A Web running direction
B Sensor field of view

1	No print mark	Locking active
2	Scanning of print mark	Guiding active
3	No print mark	Locking active
4	Scanning of print mark	Guiding active
5	No print mark	Locking active
6	Scanning of print mark	Guiding active
7	No print mark	Locking active

Fig. 9.7: Print marks

Note:
Since print marks can be very short and it is not practical in many printing systems to position a print mark exactly under the sensor field of view, a cut out print mark can also be used for calibration. This template is positioned under the field of view of the SE-46 sensor during the calibration and is calibrated as a reference. Make certain that this reference corresponds exactly to the web print and the distance to the surface of the material web does not deviate significantly during calibration.

Note:
We recommend using a D-MAX operator interface for more precise calibration. This makes it possible to perform the calibration based on image information from the imager of the SE-46.

10 MAINTENANCE

Maintenance work

The sensor's viewing window must not have any contamination on it. Therefore the viewing window must be cleaned at regular intervals with a neutral glass cleaner and a soft cloth.

There are no other maintenance tasks to be performed for the SE-46 sensor.

Decommissioning

- Turn off the electrical power to the sensor.
- Remove all cables from the sensor.
- Unscrew the sensor from its bracket.
- The sensor can be stored according to the specified ambient conditions (see *"Transport and storage" on page 3-1*).

  OR

  Dispose of the sensor according to your national requirements.

11 TROUBLESHOOTING

Information

The SE-46 is capable of detecting errors that occur. If a D-MAX operator interface is present in the system, error messages can be viewed on the display of the D-MAX OI.

Display possibilities

The following displays must be checked when an error occurs:

- LED display on the sensor
- Information on the display of the D-MAX operator interface if the optional operator interface is present
- the display on the web guide controller

Procedure

If an error occurs, check the following items:

1. Check the LED display on the sensor

   see table *Page 11-2*

2. Has the calibration already been performed?

   no: perform the calibration, see *Calibration of the SE-46, page 6-7*

3. Could the calibration not be completed successfully?

   no: see *Problems when calibrating the reference, page 11-5*

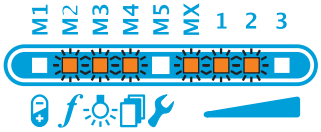
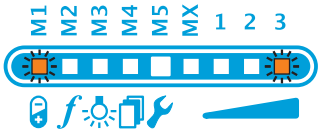
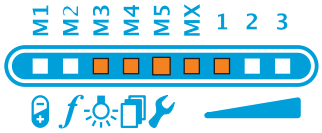
4. Does the sensor find the calibrated reference in operation?

   no: see *Faults, page 11-4*

5. Check the settings on the web guide controller

   see *Problems with guiding, page 11-6*

LED display on the SE-46

LED display	Indicates	Remedy
	Calibration invalid because – faulty or – calibration not performed yet	Perform calibration see also *Calibration of the SE-46, page 6-7*
	Calibration valid, but reference not detected	Reference not in the sensor field of view: Guiding locked
		Reference in the sensor field of view: ● Adjust the parameter for deviation tolerance, see *M1 Deviation Tolerance, page 7-2* ● Check whether the active field of view has been restricted, see *MX.1 - Active Field of View, page 7-13* ● If the active field of view has been restricted, calibrate the reference again ● Check whether the distance between the sensor and web has changed substantially
	Sensor is controlled by a D-MAX OI (Operator Interface) and the D-MAX OI is in a menu that is not available on the sensor	Select the user level on the D-MAX OI If that is not possible, turn the power supply of the sensor off and back on again
One or two adjacent LEDs are lit	Operating display only if a reference is found	If the reference found by the sensor is not the one required, calibrate the sensor to the required reference

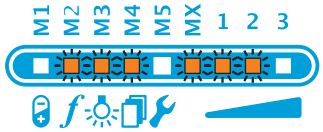
LED display	Indicates	Remedy
No display present	No power supply?	Check the power supply
Displays not listed in this table	Is the sensor in a menu?	Continue pressing the SET key until a normal operating display appears If that is not successful, please contact an employee of Fife-Tidland GmbH

Faults

Fault	Reason	Remedy
The sensor is recognising the reference poorly or is no longer recognising it	The ambient light has changed significantly	Restore the original light conditions or Recalibrate the sensor
	Dirt on the sensor's field of vision	see Section *Maintenance, page 10-1*
	Ambient light hood tilted	Lock ambient light hood in place see *Fig. 1.1, page 1-2*
	The reference may have changed within the material, for example colour gradients or deviations in the width of the reference	Increase the deviation tolerance see *M1 Deviation Tolerance, page 7-2*
No light during the calibration	For application with light striking the surface: external illumination selected For application with light passing through: RGB standard illumination selected	Check type of illumination see *M3 Type of Illumination, page 7-5*
At high web speed the interrupted reference is no longer found	Scan frequency not correct	Adjust the scan frequency and recalibrate the sensor see *M2 Scan Frequency, page 7-3* and *Calibration of the SE-46, page 6-7*
The reference is still found even though it should not be	The reference is still ignored even though for example there are colour gradients or the width of the reference deviates	Reduce the deviation tolerance see *M1 Deviation Tolerance, page 7-2*

SE-46.Fehlersuche.fm

Problems when calibrating the reference



Various problems may occur on the sensor during calibration to prevent calibration from being successfully performed. The sensor indicates this only through the operation state message "Calibration invalid".

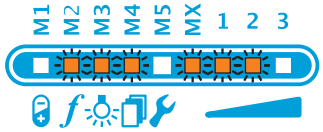
If there are problems with the calibration, check first whether

- the required reference is in the sensor field of view and whether
- the distance from the sensor to the material web is correctly adjusted.

Information about what could have caused the calibration to be cancelled may be found in the table in Section *Error messages on the optional D-MAX operator interface, page 11-7*.

The calibration must be repeated with modified conditions until it can be completed successfully.

Error message when exiting a menu



If the parameters for scan frequency or type of illumination are changed after a successful calibration, the operation state error message also appears in the LED display "Calibration invalid“.

This problem can be eliminated by

- recalibrating with the modified parameters (see *Calibration of the SE-46, page 6-7*)

or

- by resetting these parameters to the previous values manually or with a "Rollback“.

Rollback

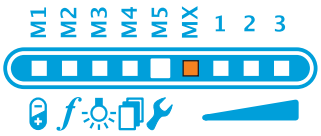
Rollback means resetting the parameters for scan frequency or lighting type to the previous values.

- Press the Teach key

  The LED of the TEACH key and the LED of the currently set sensor mode start to flash.

- Continue pressing the SET key until LEDs A, B and C in the display for the sensor mode are flashing simultaneously

- Press the Teach key



The sensor is reset to the last valid calibration and switches back to normal operation. The target light points at the position of the reference if it is in the field of view.

Problems with guiding

If errors on the sensor must be excluded, incorrect settings on the web guide controller can also lead to problems.

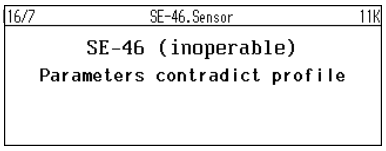
Check on the web guide controller whether the correct job is selected and the parameters for gain and polarity are set correctly.

Note:
Information about commissioning of the relevant web guide controller may be found in Section *5*:
D-MAX, page 5-1,
DP-20, page 5-8,
CDP-01, page 5-14.

Error messages on the optional D-MAX operator interface

The optional D-MAX operator interface is capable of recognising errors that occur and displaying them accordingly in operating mode "Calibration invalid".

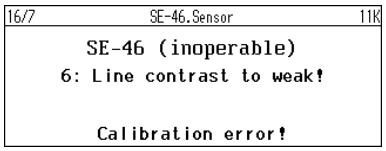
Error message when exiting a



If the parameters for scan frequency or type of illumination are changed, the error message **`Parameters contradict profile`** appears in the display of the D-MAX operator interface.

For troubleshooting see *Error message when exiting a menu, page 11-5*

Error messages when cancelling a calibration



The errors listed in the table appear in the display of the D-MAX operator interface.

Message	Reason	Remedy
`1: Contrast too weak!`	The contrast of the reference is too weak. This reference cannot be calibrated.	Please find a new reference for the calibration.
`2: Ambient light too strong!`	The contrast of the reference is too weak when the print information is too light. The ambient light may be too strong and could be having a negative effect on scanning the material web.	Check whether ambient light is striking the sensor area: ● If so: Protect the sensor from strong ambient light ● If not: Please find a new reference for the calibration Check the distance to the material web: The optical display may be fuzzy.

Message	Reason	Remedy
3: Scan freq.setting unsuitable!	The current scan frequency setting is not suitable for calibration.	Increase or reduce the scan frequency setting
4: Scan freq.setting to great!	The time window of the scan frequency setting is not sufficient to calibrate the reference.	Check whether the scan frequency setting can be reduced. If it cannot, ● find another reference or ● try the calibration in a different sensor mode
5: Line width not supported!	The line that was found does not meet the requirement for line width (too big or too small).	● Find another reference or ● calibrate the reference in a different sensor mode.
6: Line contrast to weak!	One of the two line edge contrasts of the selected reference is too weak!	● Perform the calibration of stronger line contrast in sensor mode B - Edge mode if the application permits it, or ● search for another reference.

12 TECHNICAL DATA

General information

Housing
ABS coated

Covering window
Glass

Housing dimensions
Length = 110 mm
Width = 65 mm
Height = 120 mm

Weight
about 1000 g

Protection type
According to DIN EN 60529: IP54

Ambient conditions
0 °C - 60 °C at max. 90% relative humidity, non-condensing
60 °C up to 1000 m altitude
50 °C up to 3000 m altitude

Optical properties

Working distance from sensor to material web
10 mm ±2 mm

Light source
LED with wavelengths of 630 nm, 525 nm, 460 nm

Sensor field of view
30 mm

Line width
0,5 mm to 20 mm (starting at firmware number ... - 004)
0,5 mm to 15 mm (to firmware number ... - 003)
Possible starting at 0.2 mm in 'C - pattern mode'

Scan frequency
Up to 9000 Hz

Minimum print mark length
3.7 mm (typically at 600 m/min)

Electrical connection

X1 plug connector

for Ethernet
M12 socket, 4-pin, D-coded

X1 plug assignment:

Pin	Description
1	Tx+
2	Rx+
3	Tx-
4	Rx-
Housing	Shield

X2 plug connector

for power supply and analog outputs
M12 plug, 5-pin, B-coded

X2 plug assignment:

Pin	Description
1	Uv (+)
2	Position signal
3	GND
4	Lock signal
5	Detect
Housing	Shield

Output signals

Position signal
0 to 10mA

Lock signal
0mA/5mA

Maximum permissible load
<250Ohm

SE-46.TechDaten.fm

Power supply

The system provided is optimised for the required application in terms of the electrical connection of the SE-46 sensor. Changes to this application may result in an alternative connection for the sensor and should therefore always be discussed with Fife-Tidland GmbH.

Power supply through the web guide controller

Power supply	Maximum cable lengths	Note
Through CDP-01	17m*	No Ethernet*
Through CDP-01 without servo valves	25m*	No Ethernet*
Through DP-20	25m*	No Ethernet*
Through D-MAX, DP-20 or CDP-01 without servo valves	Up to 16m	With Ethernet*
	From 16m to 30m	

* Starting at firmware number ... - 004

Nominal value
12VDC

Power consumption
<350mA

External power supply

Power supply	Maximum cable lengths	Note
Through additional 24V power source	Up to 30m	With Ethernet*
	From 30m to 50m	

* Starting at firmware number ... - 004

Nominal value
24VDC

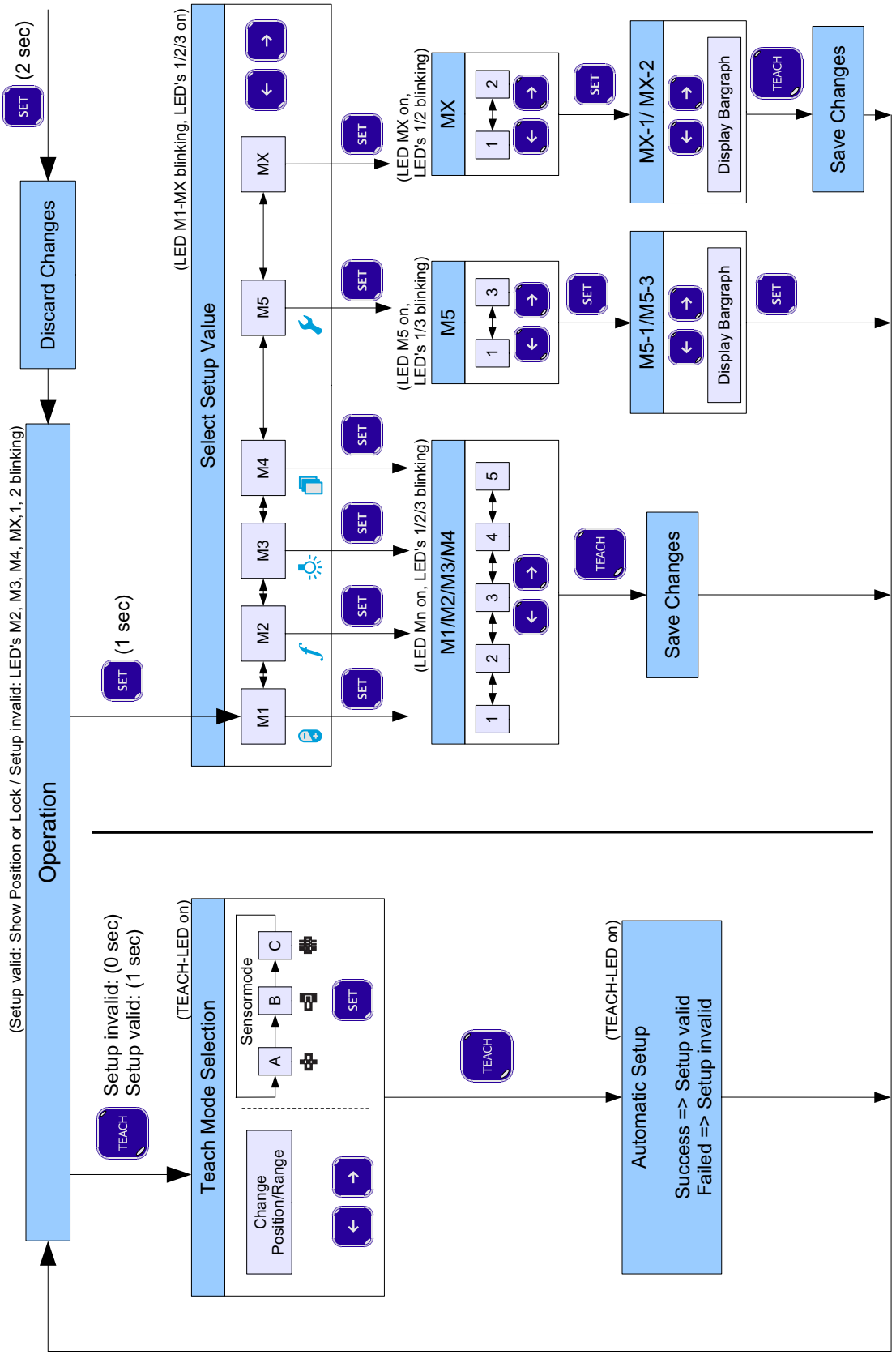
Permissible range
>21.6V to <30V

Power consumption
<220mA (changes when voltage is applied)

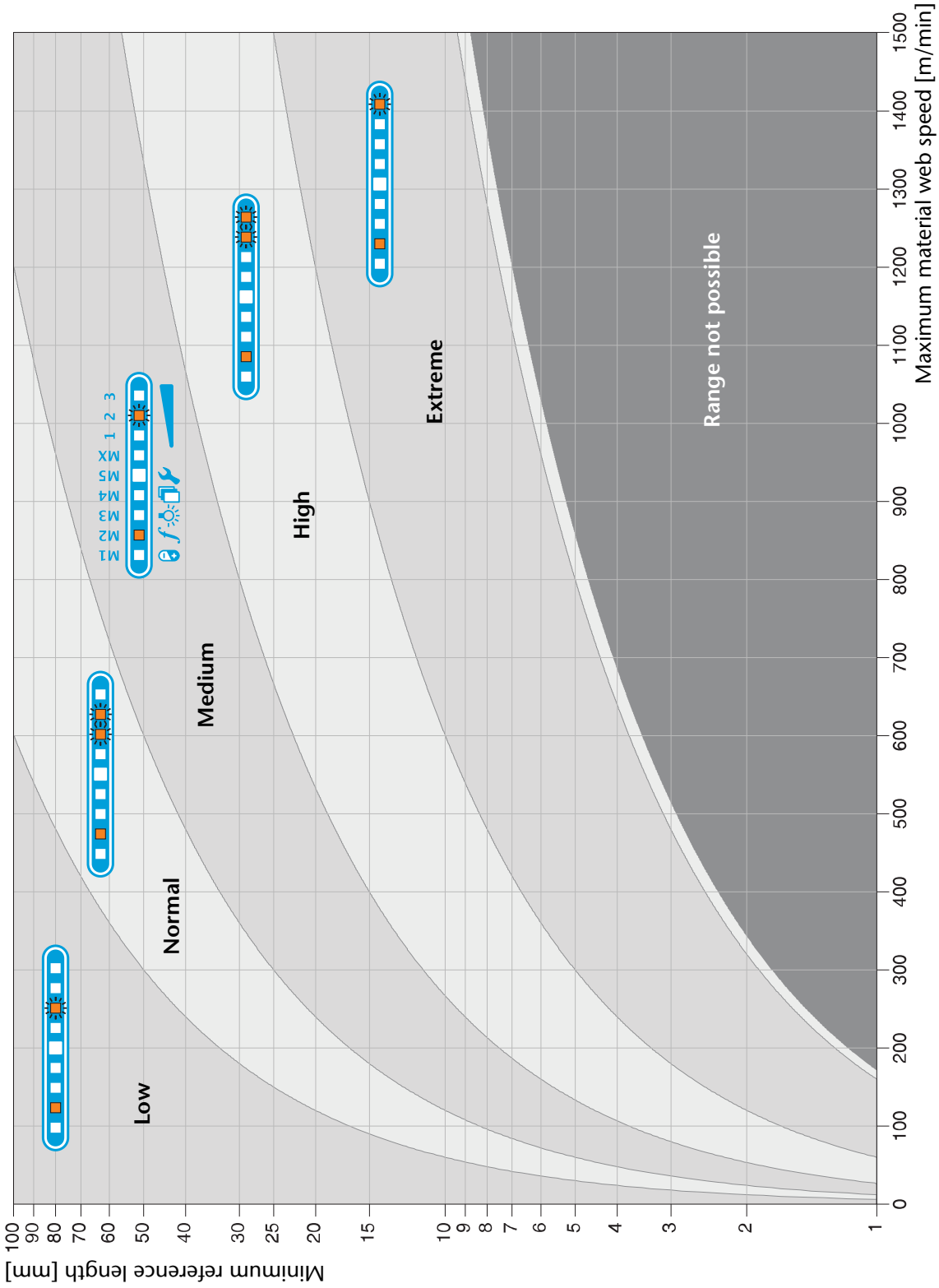
Standards and regulations

The SE-46 sensor has been constructed according to the standards and regulations of the European Union. A declaration of conformity is available on file.

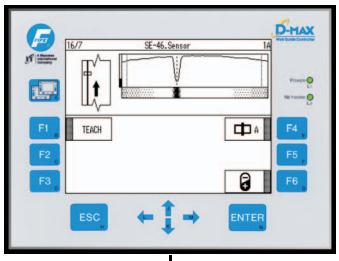
13 APPENDIX A - MENU STRUCTURE



14 APPENDIX B - SCAN FREQUENCY DIAGRAM



15 APPENDIX C - MENU STRUCTURE OF D-MAX



„x" - Sensor mode:
1 - Line mode A
2 - Edge mode B
3 - Pattern mode C

„y" - Selected profile (K, L, M, N or O)

ENTER

- xy.3 Profile Settings
  - ENTER
    - Deviation Tolerance
    - Scan Frequency
    - Type of Illumination
    - Active Profile
    - Active Field of View
    - Automatic Profile Switching
- xy.5 Hardware Settings
  - ENTER
    - Distance Gauge
    - Simulate Analog Signals
- xy.6 Control Options
  - ENTER
    - SE-46 Keypad Enable
    - Profile Selection on User Level (F4)
    - Enable/Disable Profiles
    - Orientation (SE-46 keys <-/->)
    - Length Unit
- xy.7 Configuration
  - ENTER
    - Names
    - Serial Number
    - FW Number
    - SW Number
    - Distributed System
    - Backup
    - Restore
- xy.8 Network
  - ENTER
    - TCP/IP
    - MAXNET
    - MAC-ID
- xy.9 Service
  - ENTER
    - Network
    - Measuring Points
    - Special

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16 SERVICE

Requests for Service

When requesting service, please have a copy of the order confirmation ready with the order number.

When ordering replacement parts, please indicate, (where possible) Part Number, Drawing Number and Model description.

Please be careful to keep all documents accompanying the product in a safe place. This will allow us to help you more quickly in the event that service is required.

Addresses

To request service, or if you need replacement parts, please contact one of the following addresses.

Fife-Tidland GmbH
Fifestraße 1 Siemensstraße 13-15
65779 Kelkheim 48683 Ahaus
Deutschland Deutschland
Telefon: +49 - 6195 - 7002 - 0
Fax: +49 - 6195 - 7002 - 933
Web: www.maxcess.eu

Fife-Tidland Ltd.
Millennium House - Progress Way
Denton/Manchester, M34 2GP - Great Britain
Telefon: +44 - 161 - 320 - 2000
Fax: +44 - 161 - 320 - 4513
Web: www.maxcess.eu

Fife Corporation
Post Office Box 26508
Oklahoma City, OK 73126, USA
Telefon: +1 - 405 - 755 - 1600
Fax: +1 - 405 - 755 - 8425
Web: www.maxcessintl.com